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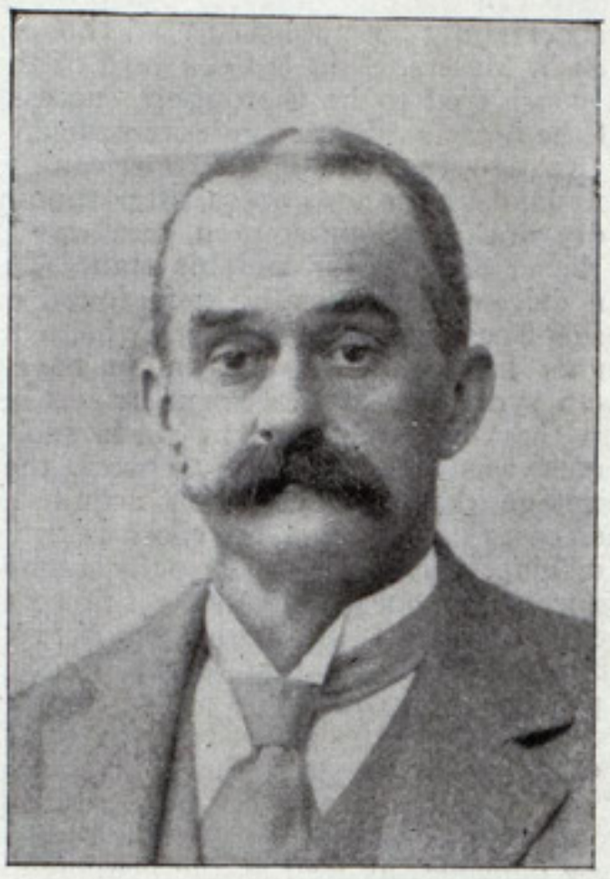
No. 19

DEATH OF MR. E. P. WILLIAMS.

Cleveland has lost a very admirable character in the death of Mr. E. P. Williams, who passed away at his home in Glenville on Monday last. He had been in poor health for some months past but it was not until the last few weeks that his trouble became alarming, his heart showing evidences of serious impairment. He died surrounded by his family. Mr. Williams was born in Cleveland in May, 1843, and graduated from the Cleveland high school in 1859. He entered Hudson college in 1860 and graduated from there in 1864. Then he went into the civil war, serving until peace was declared with the Eighty-fifth Ohio Volunteers. At the close of the war he went to Kent and engaged in the manufacture of glass, in which he was very successful. But his desire was to return to Cleveland, and in 1870 he joined Henry A. Sherwin in the manufacture of paints and oils. The firm later became known as the Sherwin-Williams Co. and it has become in its special line foremost among the world's paint manufacturers. Mr. Williams early recognized the future of Cleveland and threw himself heartily into every project to advance its interests. He was a valued member of the Chamber of Commerce, being second vice-president of that body in 1899 and first vice-president in 1900. He had for years been on important committees of the chamber.



Mr. E. P. Williams.

Mr. Williams was especially interested in work which had to do with harbor development and for this was most kindly regarded by the vessel interests. He had some vessel interests and was well posted in lake shipping matters. Mr. Williams was a member of the Union, Rowfant, Country and University clubs and was director of the following institutions: Society for Savings, Cleveland Telephone Co., Bank of Commerce, and Bankers Surety Co. He was also trustee of the Western Reserve University. Mr. Williams is survived by a widow and four children.

AGREEMENT WITH THE MORGAN COMBINE.

The announcement from London that the agreement between Mr. Morgan's International Mercantile Marine Co. and the British government has been finally concluded on the lines previously defined, makes it timely to consider briefly the conditions embodied in the agreement. These are:

First, that a majority of the directors of the company shall be British.

Second, that the ships purchased from British lines shall remain British and sail under the British flag.

Third, that their masters, the four principal officers, the chief engineers and their four assistants and 60 per cent. of their crews shall be British subjects.

Fourth, that at least half the tonnage added to the fleet shall be built in Great Britain and shall fly the British flag.

Fifth, that in the event of the combination pursuing a policy hostile to the British mercantile marine, the British government shall be at liberty to terminate the agreement, which otherwise runs for a period of twenty years and is renewable on five years' notice from each party to it.

It is to make it possible to comply with these conditions that the International Mercantile Marine Co., which holds its charter from New Jersey, has found it necessary to apply for an amendment to its charter, authorizing it to enter into contract with the United States government or any state or depe..dencies thereof, "or with any foreign government or state," including the power to sell or hire any of its steamships or sailing vessels or other property to such governments or states "for any purpose whatsoever, whether naval, military or otherwise." Concerning the agreement the Liverpool Journal of Commerce very sensibly says:

The short discussion which took place in the house of commons on the subject of the legality of the great shipping combine, ought to go a long way towards ending a very useless discussion which has been carried on in regard to the condition of our laws of shipping ownership and registration. We say useless quite advisedly, for even if the malcontents in question had their own way, and the combine were refused registration under the British flag, there would be absolutely nothing to prevent the International Mercantile Marine Co. from registering under one of the many other flags of the world, conformity to certain technical matters being the only thing needful to enable this step to be taken. Besides that it is simply quibbling to assert that the merchant shipping act by declaring that British ships must be owned by natural-born British subjects, naturalized British subjects, or corporate bodies subject to British laws, also means to declare that the majority of shares in a company owning British ships must be held by people belonging to this country. It is quite evident from Mr. Gerald Balfour's reply that in the opinion of the law officers of the crown the two cases are entirely different, and as he was backed up in this contention by Sir Robert Reid it is plain that even a change of government would not bring about any alteration in the views of his majesty's advisers. Of course no one in this country will rejoice very much at the fact that the practical control of the large amount of British shipping represented in the combine will be held in future by American capital, but money is cosmopolitan and knows no country, and wherever it goes direction and control must go with it. It is not very long ago since the weight of the influence of British shareholders in many American railroads practically controlled the working of those lines, and in all parts of the world our capitalists have by their huge investments acquired the directing power of many first-class and almost national businesses. The merchant shipping act is a piece of special legislation which, so far as this point goes, is chiefly concerned in seeing that, technically speaking, the law will have someone domiciled in this country to proceed against in case a ship flying the British flag commits an infraction of the statutory regulations. This is secured by section 1 of the act, which reads as follows:

"'A ship shall not be deemed to be a British ship unless owned wholly by persons of the following description (in this act referred to as persons qualified to be owners of British ships), namely: (a) Natural-born British subjects; (b) persons naturalized by or in pursuance of an act of parliament of the United Kingdom, or by or in pursuance of an act or ordinance of the proper legislative authority in a British possession; (c) persons made denizens by letters of denization; and (d) bodies corporate established under and subject to the laws of some part of her majesty's dominions, and having their principal place of business in those dominions.'

"It only needs the application of a little common sense to see that the above provision could never be applied to the case of the shares of a company owning ships, for the scrip being marketable these shares might change hands three or four times a day, and it would indeed be quite impossible to make any rule which would ensure a change of flag every time that there was a transfer of control. It is to the interest of every investor that his shares should have as wide a market as possible, and any interference on the part of governments, such as that which has been proposed, would most seriously and adversely affect the value of the securities held by Britishers in every quarter of the globe."

TURBINE YACHT EMERALD A GOOD SEABOAT.

Sir Christopher Furness's turbine yacht Emerald, the first turbine craft that ever crossed the Atlantic, arrived in New York on Monday from the Clyde after a stormy voyage. She has been chartered by George J. Gould and is under the command of Capt. Donald Tod. Concerning the trip Capt. Tod said:

"We left the Clyde on April 17 and no sooner did we reach the open sea than we struck gales. We did not stop, however, and on the 23rd we reached Fayal in the Azores, where we took on some coal, after which we resumed the voyage to New York. After we left Fayal we ran into gales from the northwest, southwest and northeast and it was not until the last twenty-four hours of the voyage, when we ran into a thick fog, that we experienced what may be termed good weather. At times the gales were so heavy that we had to set our reefed trysails and staysails, and then make a course as best we could. But we never stopped coming, and although we are about three days overdue the Emerald hasn't a scratch on her. She is a good sea boat. She never races in a seaway and she is as steady as a clock. The trip has been a splendid test and she has lived up to expectations."

The Emerald is 236 ft. over all, 28 ft. 3 in. beam and 18 ft. 6 in. deep. Her hull is of the usual clipper-bow type with bowsprit and figurehead. She has two masts which are schooner-rigged. Her average speed is 15 knots.

SHIP BUILDING IN AMERICA.

As Viewed by Members of the Moseley Industrial Commission—Considerable Attention given to Pneumatic Tools and Their Work.

Glasgow, April 27.—It will be appropriate to devote my letter this week to the report of the Moseley Industrial Commission, whose visit to the workshops and ship yards of America last year caused so much interest on both sides of the Atlantic. The object of the visit was to personally inquire into American methods, conditions and workmanship, and to compare them with our own. The commission was composed of twenty-three selected officials of trade unions, but for the purposes of this journal I shall confine myself to the reports of those representing the ship building and engineering industries. I shall avoid, too, the general social, political and economic comparisons covered by the report, and of which the press agencies may have given you some cabled summaries. What I deal with is the practical matter relating to ship building and cognate industries set forth by British workmen experienced in these industries. And this I do both by paraphrase and by quotation, with the consciousness all the time that much interesting matter must be excluded by considerations of space. Let us first take the remarks of Mr. Cummings, the representative of the Boilermakers & Iron Ship-Builders, on the works of the Cramps.

"At the Cramps works of Philadelphia," says this delegate, "the methods may be said to be typical. War ships, merchant ships, passenger ships are built by this enterprising concern. The establishment is non-unionist and therefore it cannot be said that any remark I may make in its praise is because of my trade unionism. Founded in 1830 by William Cramp, it has gone on from wood construction, developing and developing, until it is looked upon as one of the leading ship yards of the world. It is modeled upon British lines, the imitation of our methods being the sincerest form of flattery; and the present Mr. Cramp considered our remark, that his yard resembled our British yards more than any other yard we had seen, as the sincerest compliment we could pay him. Here again admiration of British ship building was expressed by Mr. Cramp giving expression to the opinion that our country's position as the leading ship builders was unassailable and not likely to be seriously menaced in the next quarter of a century. Pneumatic tools were certainly used here to a larger extent than we use them, but the ship yard manager would not commit himself by saying that they were cheaper than our own methods. 'Certainly,' said he, 'the necessity of pneumatic tools would not have arisen if our men could have tackled successfully the heavy riveting of today as you Britishers tackle it and make a living at the prices paid.'"

Apart from the pneumatic tools the machinery, according to Mr. Cummings, was similar, except for a novel method of softening by the blow-pipe arrangement just the part necessary to drill holes in the nickel steel armor, a method of concentrating the heat through a given spot, which the inventor claimed only softened just the part required, namely, the size of the hole wanted. Deep forging for handrail stanchions and other small work was in extensive use, but non-union as the yard was, they put upon machines the skilled men whose work the machine undertook. "In fact," says Mr. Cummings, "it may be said to be the invariable custom in the states to put skilled men to labor-saving machines, a custom that certainly avoids the friction caused by introducing labor-saving machinery and displacing the men who have hitherto done the work in favor of unskilled men."

The boiler shop was, he says, like the ship yard, "very British"; in fact the officials and foremen of the shops were extremely anxious to know whether similar machines to theirs were in use in Great Britain, and when any remark was made about a superior machine they were not satisfied until they got sufficient details to enable them to make experiments of a similar character. "Altogether they were a go-ahead lot, and inquiries brought out the information that they personally benefitted by every improvement they made."

Summing up the ship building and marine boiler making, Mr. Cummings says: "I do not consider that America seriously menaces our trade, but on the contrary, the competition is not so great as I anticipated. The tonnage of the great lakes can be dismissed as a local trade in which even the American builders on the Atlantic and Pacific borders cannot seriously compete; in addition, there is still a large quantity of small and composite vessels built, and when war ships and river craft are deducted, the iron and steel tonnage left for competition is smaller than one anticipated. The only modern method suitable to them which may not be suitable to our British ship yards is pneumatic riveting, but the ship owners in a country like ours will naturally look askance at a method of riveting a ship which, while not making it any more durable, adds enormously to the cost of repairs, one informant stating that it costs as much to cut out pneumatically-riveted work, as it does to complete the whole of the repairs on the other system. As to the boiler shops and ship yards, our own heavy machinery is certainly superior, and generally speaking the work done is not of so good a quality as the work done at home. As for working hard, it was generally admitted that it was impossible for men to work harder than the piece work ship yard worker does work in Great Britain." [Yes, when he *does* work, but Mr. Cummings does not mention how often he plays. The trouble in the British ship yards is not with the quality of the work but of the quantity of the idle time of the work.]

As against what the representative of our Boilermakers & Iron Ship Builders says about pneumatic riveting—concerning which there is much difference of opinion in this country—it will be of interest to place before you the views of one of the representatives on the Clyde committee of Lloyd's Register of British & Foreign Shipping. Speaking a day or two ago at a meeting of ship owners, ship builders and others at Greenock, Mr. D. MacDougall said that during the last four years a considerable number of cases of damage, more particularly to steamers engaged in the Atlantic trade, had been observed at the different repairing ports. Some of these cases arose from defective riveting, the thickness of the material necessitating larger rivets being used than it was in the power of man's muscle to drive satisfactorily home. Pneumatic riveting was largely used in America, and once the system is perfected must come into general use in this country also. In no other way than by machinery can the difficulties of riveting those enormous structures be successfully accomplished, and though the exhibition recently given in Messrs. Scott & Co.'s yard of the pneumatic system was not considered to be thoroughly successful, still they all hoped that the defects might soon be remedied. It was reported a week or two ago that the large American-owned and built steamer Kroonland, 12,750 tons gross, after running from July was placed in dry dock at Southampton, and was then critically examined by the chief surveyor and his staff. The rivets, which had all been driven pneumatically, were found in perfect order, even in those places which, considering the nature of the weather the steamer had come through, might have been expected to have shown symptoms of movement or leakage. It would, therefore, seem that the Americans in yards such as Cramps, where the steamer was built, are able to work the machines to a greater advantage than has yet been acquired in this country. The other cases of damage were those resulting from what is termed "thrashing," and more principally found in the fore bodies of steamers, and one could hardly believe that damage of such an extensive nature could arise from heavy Atlantic weather. The fact is that the alteration of the model of the vessel from the long sharp ends with high rise of floor to fuller ends and a flat floor has caused the plates between the frames to be buckled in an extraordinary degree, the hold stanchions in many cases being set up and seriously bent, the result being a state of matters no one could foresee when the new type of vessel was introduced. These damages, as well as the breakage of screw shafting, occupied a great deal of attention during the first portion of his present period of office, but with the thorough concurrence and co-operation of the technical committee the rules have been altered whereby additional strength has been added to the forward bodies of vessels so constructed, and propeller shafting has also been very considerably increased in size.

But it was only with reference to pneumatic riveting that I refer to Mr. MacDougall in this connection as representing a different opinion from that of the official of the riveters' trade union. To return to the Moseley commission, the following general impressions are from the report of Mr. D. C. Cummings: "Gambling and pleasure seeking appear to be characteristic of the American's life. These taken in conjunction with his ordinary restless spirit seem to shorten life, make men prematurely old and increase insanity. Climatic conditions may be to some extent the cause of the general unhealthy look of the American people, but the opinion generally expressed to enjoy life while it lasts has also some effect. There is, however, less regard for human life in America than in our own country. Life altogether is held cheaper, and that may be inherited from earlier times when firearms were used on the slightest provocation. Altogether I am of the opinion that a halting time will have to take place in the states. The rush for enjoyment, the disregard of human life, the corruption of local politics and other immoralities, and the almost Continental Sunday, added to which is the disinclination to walk or make any exertion after business hours if it can be avoided, all tend toward the moral and physical deterioration of the people, and must be arrested if disaster is to be avoided."

It is presumably ship yard workers to whom Mr. Cummings refers when he says that while the American workman is sober during working hours he is nevertheless as much inclined to a spree as the ordinary Britisher. A comparison shows that the annual American consumption of beer is 16 gallons per head and the British 27 gallons per head. That is, 11 gallons per head less for the American. But on the other hand the American consumption of spirits is eleven-tenth gallon, and the British one-tenth gallon, so that in "hard" drinks the American goes eleven times more than the Britisher. Mr. Cummings says further: "Regarding drinking habits one excellent custom prevails—in no firm or establishment we visited was drinking intoxicating liquors permitted. Even a luncheon would be served without beer, wine or spirits, the usual drinks being iced water, milk, coffee or tea, an example to the men that some of our English employers could copy with advantage." The bearing of this remark is not quite obvious. The absence or presence of intoxicating liquors at the counting house luncheon to which casual or distinguished visitors are invited can hardly afford any example to the men.

In a comparison of American with British workmanship, the secretary of the society of Boilermakers & Iron Ship Builders thinks that opportunities of early training and education tending toward the better equipment of workmen are certainly greater in America than in England, but the system adopted in America of dividing and sub-dividing skilled mechanical labor to a greater extent than prevails in England undoes the benefit of the early

training. It produces a better educated unit, but one less capable of doing general work in a given trade than the average English mechanic. But he thinks that if greater facilities obtained in Great Britain to give apprentices better opportunities to obtain a better technical knowledge of their trade our "undoubted superiority" in general workmanship would be greatly enhanced. Technical institutes for every industrial center should, he contends, be provided in this country in which those learning a trade could readily obtain a theoretical and technical knowledge of that trade. This view, however, does not seem to be entertained by all the delegates.

As to whether the American workman does more work in an hour than the British workman, Mr. Cummings unhesitatingly says "no." Less piecework is done than in England where ship building is done at piecework rates, and also in the boiler shops, where, however, pieceworking is not common in this country. Our own system, thinks Mr. Cummings, "while financially beneficial to the men, is also certainly beneficial to the employers, and in my opinion is the chief cause that enables them to so successfully maintain our country's supremacy in ship building." British workmen, he thinks, have at least as much initiative as the American workmen, and are quite as capable of working without overlooking, and frequent detailed instructions, as the American. In fact, "Britishers are found to be doing the best work in many of the American yards and shops and in positions of trust." The equipment of ship yards and workshops in machinery is not better than in Great Britain; in fact, "better machinery can easily be found in the old country," and "the class of work does not compare favorably." He admits, however, the better heating, lighting, ventilation, etc., of some of the workshops.

Mr. Wilkie of the Society of Associated Shipwrights says that at Pittsburg "we met a number of representatives of American workmen, several of whom were originally from Britain, and we elicited the information very clearly that the American workman does not work any harder than the British artisan. That his output in many cases is greater is due to the organization of the works, the class of work, and the superior tools and machinery at his disposal. Of course, it may be a fact that in certain occupations in America there may be a greater intensity of work than in similar work in Britain, but it did not come under my observation." While he found some factories well equipped for the comfort and well being of the men he found others inferior to similar factories in England. "In America there are sweating shops as bad as are to be found in Britain." As regards equipment for production, Mr. Wilkie does not find the American yards better. So far as the general plant and equipment of the yards are concerned, and the machinery in the shops, many of the yards in this country are equal, if not superior, in equipment to those in America, but smaller tools appear to be more extensively used in America than here—such as tools for drilling, riveting, caulking, etc.—but as concerns the constructive, erective and general work of the shipwright, which cannot be executed by machinery, the methods adopted by the craft are, in Mr. Wilkie's judgment, "much more efficient in this country than in the states."

This is Mr. Wilkie's general view, as a practical shipwright, of American ship building: "So far as could be ascertained from interviews with representative workmen and others of reliable authority, the work carried on is not so substantial as with us, and there does not appear to be the same regard for completeness as there is in the yards of this country. The vital distinction between the yards of this country and America appears to be that the work in the British ship yards not only has a better finish but is of a much more stable and enduring character. On the American side they build more for the present and have not that regard for the permanent stability which is the characteristic in the British ship builder. Notwithstanding the great natural resources of America in iron ore and in coal, the main elements in the production of steel, and allowing even for a greater use of machinery on a considerable amount of work done in the ship yards, it will be years before they can even approach, far less surpass, the British nation in ship building, as the large shipbuilding yards of this country are not only as well equipped and well managed, but the workmen by their training through the apprenticeship system are better equipped for turning out ships than are their American confreres." Mr. Wilkie expresses his confident belief that Great Britain's present pre-eminent position as far as ship building is concerned has been secured, assured and maintained through the apprenticeship system, and he adds: "So far as the United States are concerned, the fact was given to us on high authority that in consequence of the extreme subdivision, specialization and classification of labor, the learning of a trade was almost a thing of the past; as a result it was found necessary to obtain skilled workmen from abroad."

On the subject of the general equipment of the factories, however, the delegates differ. Mr. Moseley's own view is thus expressed: "In American factories, speaking generally, great attention is paid to the necessities and comfort of the workers. Separate lockers (of which the workman has the key) are provided for working clothing; consequently the man can arrive at and leave his work well clad, changing at the factory. The shops are usually very well ventilated. Excellent lavatories with shower baths, etc., and many other comforts for the employes, are the rule rather than the exception in the large factories; and, in fact, the American manufacturer has realized that if he wishes the best results from the hands he employs he must provide for their comfort and cleanliness. It is not a question of philanthropy, but of practical business." Mr. Barnes of the Amalgamated Society of Engineers answers. "No. The needs of the workers are no better provided for in America than in England. In fact, I should say that excepting workshops which have been mentioned as being well found, the American workshops, so far as I could see, are dirtier, more insanitary and more congested than the ordinary English workshop. But it should be said for the American workshops that they are generally well heated by hot-air blasts or piping in winter time and cooled by fan or other arrangement in summer. This is a matter almost entirely ignored in this country."

As to workmen and machinery Mr. Moseley says that in America labor-saving machinery is "encouraged by the unions and welcomed by the men, because experience has shown them that in reality machinery is their best friend," and this statement is borne out by some of the delegates, but others say that in this respect America is not different from England. Mr. Walls (blast furnace-men) says he does not believe that there is any "substantial ground for the charge that workmen in England object to improved appliances, even when fewer men are likely to be employed," and Mr. Cox (ironworkers) says: "A very prominent manager in America said to me that the greatest difficulty the employers found was in overcoming the prejudice of the men in the introduction of new machinery." There may be some managers in this country who would make a similar statement. In America I do not think the statement is correct in its general application, and in this country I am sure it is not—that is, so far as our organization and wages boards are concerned. With the actions and oppositions of unorganized individuals I have no concern."

Mr. Cummings thinks it may be said to be the "invariable custom in the states to put skilled men to labor-saving machines, a custom that certainly avoids the friction caused by introducing labor-saving machinery and displacing the men who have hitherto done the work in favor of unskilled men," and Mr. Wilkie did not find that the workmen made any objection to labor-saving machines "where they received a fair share of the value of the increased output as a consequence of their introduction." He adds that when the same basis is acted on there is no objection on the part of the workmen in this country.

There has long been an impression here that in America one workman attends to a greater number of machines than in England. The question was definitely asked the delegates, but their answers differ. Mr. Barnes of the Amalgamated Society of Engineers says there is but little difference in this respect as between America and Great Britain. Both there and here there are certain automatic machines, of which two or three, or even more, can be and are attended by one man, and in some American piecework shops a group of men and boys will have access to perhaps double as many machines and sometimes more. In these cases the machines are not running all the time. In Canada he saw two men working together on piecework and attending to three machines between them, and in a New York piecework shop he saw cases of men attending to two machines each, but these were exceptions. As a rule the machines upon which work of any considerable value is placed, or which are capable of a wide range of work, are each attended by a man, and in the case of heavy lathes and planers the operator has a helper with him all the time. "Of course," said Mr. Barnes, "I know that the contrary has been asserted by jaundiced journalists 'on tour,' who have repeatedly stated that American workmen operate two or three machines each, and that piecework is general in America. I am glad to have an opportunity of stating, after actual observation and from inquiry, that these assertions are untrue."

It is probably not necessary to go further into the conditions in engineering and iron and steel working, as the purpose of this letter is simply to present some of the chief features of the reports as relating to ship building.

SHIP YARD NOTES.

A four-masted schooner, the Frederick A. Duggan, was launched from the yard of the New England Ship Building Co., Bath, Me., last Saturday. She is 195 ft. long, 39 ft. beam and 18 ft. deep. She has a double deck with a poop deck extending to the mizzenmast. The Duggan has been constructed in a thoroughly workmanlike manner and is equipped with all the latest improvements.

On Saturday last the Bath Iron Works, Bath, Me., launched the steel barge Shenango, building for the J. M. Guffey Petroleum Co. of Pittsburg, Pa. Her dimensions are: Length over all, 300 ft.; beam, 44 ft. 6 in.; depth of hold, 23 ft.; draught, 18 ft. The Shenango has three decks with a trunk 10 ft. deep and 15 ft. wide in the center, extending two-thirds the length of the ship. It is subdivided into eight watertight compartments which are separated through the center by a longitudinal bulkhead, thus making sixteen oil tanks.

Official notice has been received by the commandant of the Charlestown navy yard that the secretary of the navy has decided to allow this yard to build one of the two training ships authorized by the last congress. The appropriation for the training ship is $375,000, exclusive of armament. This steel training ship will be the first of any size to be constructed at Charlestown since the days of the civil war.

DELAWARE RIVER SHIPPING MATTERS.

Philadelphia, May 6.—Edward J. Stotesbury, Richard H. Rushton and George F. Baker will have charge of the finances of the William Cramp & Sons' Ship & Engine Building Co. for the next few years. These three men were named by the directors at a meeting held a few days ago to act as voting trustees of the big corporation. The old directors, Thomas Dolan, Clement A. Griscom, Morton McMichael, Samuel Dickson, Charles A. Cramp, Henry W. Cramp, Edwin S. Cramp, William H. Barnes and Henry Seligman presented their resignations but no action was taken. The resignations were laid on the table. Mr. Stotesbury in the new voting trusteeship will represent the deposits of stock which have been made with his firm, Drexel & Co., bankers; Mr. Rushton is president of the Fourth Street National Bank of Philadelphia and Mr. Baker is at the head of the First National Bank of New York. While the program for the future of the new Cramp company has not been announced by the new regime, it is certain that it will do whatever it can to increase the value of the stock which it holds as security for the loan it made the company of $7,500,000. The reorganization of the company means that the great Cramp plant is virtually under the control of the Morgan interests and that there will be a reconstruction of the cradle of the American navy. It is the vessels turned out from the Cramps—the warships and merchantmen—that have made the Delaware river the greatest ship building seaway in the world next to the river Clyde. It is believed that the new regime is closely related to important shipping interests and that the reorganized Cramp company will do all repair work for the International Marine Co., which it is said would prove to be more profitable work than building warships. It is presumed, of course, that in due time new directors representing the interests of the parties who supplied the new capital will be elected and take the places of other directors. It will not be known who of the present directors will resign until definite action is taken, but it is said Samuel Dickson, W. H. Barnes and Clement A. Griscom will be three of them. More than 50 per cent. of the Cramp stock has been deposited with Drexel & Co. assenting to the plan of reorganization and approving of the loan of $7,500,000. Five million of the loan is to be raised at once and the balance of $2,500,000 as needed. "The loan does not increase the indebtedness of the company," said one of the Cramp officials. "It means a refunding of the debts of the company for a period of twenty years. Less the discount, the rate of interest will not be far from 5 per cent. About three years ago we remodeled our plant at great expense and have since spent in improvements over $2,000,000. We have had to carry about $2,000,000 in material, supplies, etc., and this created our floating debt of over $4,000,000. When money became scarce our trouble began. The banks of New York and Philadelphia practically withdrew from the market as lenders on commercial paper, no matter how gilt-edged it was. We at once saw the necessity of creating a bond issue, and the matter was a subject of negotiation up to the time of the deal for the loan and a reorganization." Stockholders of the Cramps company will vote June 25 on the matter of increasing the capital from $5,000,000 to $6,250,000 and the bonded debt from $1,800,000 to $7,500,000.

At the large ship yard of the New York Ship Building Co., Camden, the work of roofing over the new drafting building, an annex to the office building, is now going on The draughting building will probably be occupied in about ten days. It is of brick, one story in height and has roof skylights. The foundation for the addition to the storehouse is about completed, and in about three days work will be commenced on the annex. The addition will be one story high, 80 ft. long by 40 ft. wide, and will be built of brick and iron. The one-story copper shop, completed recently, is now fitted up as a workshop and occupied. President Morse of the company is expected home from Europe about the latter part of May, and when he returns it is likely the question will be decided as to what use will be made of the land recently acquired, lying along Timber creek in Gloucester city. This land was occupied by the old Gloucester Iron Co. and the foundry and shop buildings on it are so delapidated that they will be torn down. Four ships are now on the ways—two of them being oil steamers 625 ft. in length. Plans for the new cruiser Washington, the contract for which was recently awarded the New York Ship Building Co. by the government, are now engaging the attention of the draughting force. Work throughout the plant is brisk and a large number of employes have recently been taken on in the machine shops. Large numbers of new dwelling houses are being erected by builders and speculators in the immediate neighborhood of the ship yard, and as showing the demand for them on the part of ship yard employes, all the houses are rented or leased long before they are completed.

Rear Admiral George W. Melville, engineer-in-chief, United States navy, read a paper on "The Military Importance of Naval Engineering Experiments" at the meeting of the Marine Engineers' Club of Philadelphia, May 20. In part he said: "I believe that Germany's battleships, for their tonnage, are the best afloat. The cost of the five ships authorized by the last congress for the United States navy will be $20,000,000. The armor, armament and equipment will cost an additional $15,000,000. so that the actual cost of each battleship will be about $7,000,000. The excellence of construction in war ships, as well as in the building of merchant vessels, is not the result of a progressive series of failures, either in design, construction or operation. The success of the Germans can only be accounted for by the fact that reflection, study and research have governed them in their work. It is her appreciation of the value of experimental work and investigation that has caused Germany to advance progressively and successfully. For 100 years Germany as a nation has carried on more original research along technical lines than any other power. America and England have put to practical application many principles that Germany has established. Germany's expenditure in great part has taken place before the ship is laid down, while in the case of the rival powers tests and experiments have been conducted in discovering means to overcome avoidable defects."

The board of directors of the Philadelphia Maritime Exchange reorganized last week and the following officers were elected: J. S. W. Holton, president; P. F. Young, vice-president; Jos. A. Ball, treasurer; E. R. Sharwood, secretary; J. T. Kernan, assistant secretary; John F. Lewis, solicitor. Mr. Holton, the new president, is secretary of the Sterling Coal Co. and a member of the board of port wardens. Mr. Young, the new vice-president, is the Philadelphia representative of the Atlantic Transport Line. The two new directors recently elected, John Baizley and Josiah Monroe, attended the meeting.

The steamboat Penn for the Ericsson Line was launched at the works of the Harlan & Hollingsworth Co. at Wilmington, Saturday. Miss Cadwalader of Philadelphia, daughter of the president of the Ericsson Line, was sponsor. All the officers of the company were present at the launch, which was successful in every way. The Penn will ply between Philadelphia and Baltimore. She is 203 ft. long over all, 23 ft. 10 in. beam and 9 ft. draught. She has accommodations for 960 passengers and also considerable space for freight.

James B. Canby, chairman of the grain committee of the Philadelphia Commercial Exchange, says anent the complaint of Berlin, Germany, dealers, that grain shipments from Philadelphia are in bad condition: "The trouble arises from the moist condition of western corn received at this port for shipment. So wet is it, that although it passes inspection here when stored on the vessels, it generates heat and quickly spoils in transit. The complaint from Berlin is the first we have received for years."

The battleship Maine, after having discharged her ammunition at the League Island navy yard, was taken to Cramps' ship yards, Monday, where she will undergo repairs to two of her boilers and will have the supports of her turrets and 6-in. guns strengthened. Pending the repairs, and contrary to the usual custom the Maine will not go out of commission but will fly the pennant of Capt. Leutze during the whole time she is at the ship yard. Only a part of the crew, h wever, will remain aboard.

The oil tank steamer S. V. Luckenbach has been wholly given up as lost. She left Sabine Pass, March 21, for Philadelphia, loaded with 800,000 gallons of oil, consigned to the Sun Oil Co. of Philadelphia. Capt. Thompson and crew of twenty-six men presumably went down with the vessel. There are at present more than 1,200 men on the training ship Minneapolis at the navy yard. They are landsmen and are being put in trim to be placed in the regular naval service.

In the United States court at Trenton, May 2, Eugenia C. Griffith brought suit contesting the right of the United States court in appointing Francis McGovern receiver of the Pacific Packing & Navigation Co., generally known as the trust. Mrs. Griffith owns $280,000 of stock in the company and alleges that there was collusion to have a receiver appointed so that the trust's business could not be wound up by the New Jersey courts. Argument will be heard later.

Among deaths in marine circles at Philadelphia recently are the following: Com'dr. Julian St. Clair Ogden, government inspector at the Neafie & Levy ship yard, aged 55; Capt. Henry Behnken, in command of merchant marine vessels of German lines for twenty-eight years, aged 69; Capt. John J. Smith, a noted North Atlantic whaler, aged 72; John J. Willard, foreman at the ship building works of Lynn Brothers.

Capt. James C. Sanford, United States engineer's corps, who will relieve Col. C. W. Raymond as chief engineer of the Delaware river improvements, reached Philadelphia, Sunday, but did not take charge of the office at once. Colonel Raymond and Capt. Sanford made an inspection of the dredging and other operations in connection with the construction of the 30-ft. channel in the river to the Delaware bay.

The waters of the Schuylkill river have in past years washed down thousands of tons of anthracite coal and much of it is deposited in the several river dams. The Schuylkill River Navigation Co., operating near Hamburg, Pa., is extracting the coal from the river bed by suction through a 6-in. pipe. Three scows, 10x32 ft., are at work, and similar plants will be established at other dams on the river.

A new dredging tug, the L. Y. Schermerhorn, owned by and named after an officer of the American Dredging Co. of Philadelphia, was given a trial spin in the Delaware river last Monday. The vessel is 110 ft. long and has 23-ft. beam. She was built at the company's Camden shops and will be used in deepening the Delaware river channel.

Two barges containing flowers will be towed out into the Delaware river below League island, decoration day, and on arriving in mid-stream the flowers will be cast overboard in remembrance of the sailors and marines who perished in southern

waters during the civil war. A war ship will fire minute guns during the ceremonies.

As a great deal of the metal work on the vessels at the Cramp ship yards are nearing completion, a large number of the men were laid off during the past week. These employes, as a rule, secured work almost immediately at the yard of the New York Ship Building Co. in Camden, on the opposite shore of the Delaware river.

Supervising Inspector-General Geo. Uhler of the United States steamboat inspection service, will this week issue instructions for the appointment of an assistant inspector of hulls and an assistant inspector of boilers for the port of Philadelphia. Increase in the commerce of Philadelphia makes the appointments necessary.

President J. W. Tierney of the Philadelphia Pneumatic Tube Co. returned from a western visit last Saturday. He states that the company established branch houses at Denver and Salt Lake City. He has orders from the Mare Island navy yard, San Francisco, for riveters, clippers, drills and other tools.

The immense power plant of the York Haven Water & Power Co., at York Haven, is nearing completion. The great "sea wall" of the dam is more than a mile long and is founded on the solid rock bed of the river. It is 24 ft. wide at the bottom and 6 ft. at the top. Its height is 30 ft. in places.

The annual meeting of stockholders of the Philadelphia bourse will be held Tuesday, May 12, at 3 p. m. An election for seven directors to serve for a term of three years will be held at the office of the company on the same date.

Capt. Charles D. Sigsbee of "Remember the Maine" fame, took formal charge as commandant of the League Island navy yard, May 1, vice Rear Admiral Sands, who takes command of the Atlantic squadron.

A handsome loving cup was presented Gen. Jared A. Smith of the United States engineer corps upon his retirement, last week, at the Wilmington office. The cup was presented by employes of the office.

Capt. William Holdzkorn, keeper of the South Brigantine life saving station for thirty-one years, died at Atlantic City April 25, aged 69. He rescued fifty persons from watery graves during his career.

Civil service examinations will be held at the Federal Building, Philadelphia, May 26, for the positions of nautical expert and nautical draftsman and designer for government service.

Twenty-two thousand bags of nitrate of soda, the largest shipment ever made to Philadelphia, arrived last week on the British steamer Crireveth Castle from Iquique, Peru.

David C. C. Mink died last week at his home in this city. He was general manager of the Clyde Steamship Co. and president of the American Steamship Association.

James McCauley purchased the schooner William H. Davidson at U. S. marshal's sale last week for $5,500. The vessel was sold to pay salvage claims.

HOW JACK IS FED.

The 250,000 lbs. of tobacco which the navy department has just bought for the sailors and marines, like most things furnished to the navy, is good enough for anybody. Jack, in fact, is critical about his tobacco and has long been used to an excellent article. Nearly all sailormen smoke, and most of them chew. The plug tobacco served out to the men at cost is used for this purpose. Cut up into chips of suitable size, or crumbled between the fingers, it makes a sweet smoke for a pipe. Many officers buy it for such use. Jack does not double on the tobacco tub as he used to double on the grog tub in the days when grog was furnished free at the foot of the mast to the men lined up in order, and each holding out his tin cup. Jack does, however, sometimes save his tobacco and resell it at a profit, for he buys at the lowest wholesale rate, and by a little self-denial can easily save a fair proportion of his share. He takes a great satisfaction in the fact that what is good enough for him is good enough for his superiors in rank. Some officers suspect that the excellence of all articles furnished to the enlisted men of the navy has a good deal to do with their effectiveness as fighting machines. Jack's food and drink are just as good as his tobacco. No hard liquors are sold to him, but he has the privilege of buying a moderate quantity of bottled beer aboard ship. Here again he cannot "double on the tub," but occasionally a hard drinker will by dint of almost superhuman self-denial accumulate enough beer in the course of two or three weeks to give him something like a spree, and perhaps get him a sentence of ten days on bread and water.

Nothing strikes the stranger aboard ship more favorably than the abundance and excellence of Jack's food. Early in the morning he has bread and coffee. Later comes a hearty breakfast. This meal, like every meal served to the man-o'-war's man, must be tasted by the officer of the deck before it is given to the sailor. It is a bit of a ceremony that tasting of Jack's food by his superior officer. As the officer paces the deck in the early morning a boy from the cook's galley solemnly approaches with a steaming bowl of whatever is the breakfast of the day. A portion is served out in a proper dish, and the officer, with a judicial air, takes a mouthful. It is often so good that he makes a pretty good meal as he stands there on deck. If the food is in any way what it should not be he looks into the matter at once, and Jack's wrong is, if possible, instantly redressed.

Since the days of the old-fashioned sailing craft or the slow steaming craft the food of everybody aboard the ships of the United States navy has greatly improved. No voyage is now really very long—that is, no ship of the navy is ever more than three weeks without touching at some port where fresh food may be had. Jack gets his share of the good things, and if he wants more he can buy ashore for himself. Even the eggs of the navy are no longer the dreadful things they once were, when the cleverest shifts of the ablest cook could not disguise the fact that the omelette ought to have been eaten weeks or perhaps months before. Even on the voyage across the Pacific the food seldom reaches a condition to drive away appetite. In fact, a man-of-war crossing from the Philippines to San Francisco is likely to have no worse table, whether in wardroom or in forecastle, than the winter table of many well-to-do families in New York. Fresh food taken aboard at the beginning of the voyage will last part way to Guam, and if the ship is not in too much of a hurry to touch there more may be had. Again fresh food of great variety can be had at Honolulu, and thence the run to San Francisco is only a few days. When a ship is on a pressing errand she may be too much hurried to stop for fresh supplies, and in such case everybody gets pretty tired of "salt horse," canned vegetables, and ship's biscuit. But men and officers never suffer the discomforts of those who went on the sailing ships of the old navy from Cape Town to Montevideo, when the greenery and charm of "The Mount" seemed to the sea-tired eyes of all on board beautiful beyond belief.

ADMIRAL MELVILLE ON WARSHIP CONSTRUCTION.

Rear-Admiral George Wallace Melville, chief of the bureau of steam engineering, navy department, has written an article for the Philadelphia Ledger on the tendency in warship construction. Among other things he says:

"When will the limit of size be reached, if each increase in displacement has made the ship a better fighting machine? The limit of size will not be reached until the demand of the engineer for space and weight for machinery is given the same recognition that is accorded the ordnance and hull experts. It is certain that warships must be made even larger, and in accordance with this belief the British admiralty has projected battleships of 18,000 tons displacement. Boilers are still made too frail, since their tubes are too thin, their casings too light and their drums too small. This shaving in weight of important parts also extends to the engine-rooms, for engine frames are not as strong as they should be. The tubes of condensers are too contracted; the piping is too complex by reason of the crowding of auxiliaries, and altogether there is a forcing of appliance into contracted spaces beneath the protective deck that results in excessive repair bills and long stays in port. An increase in weight would keep the ships longer at sea, and it would seem that this reason alone would correct the evil of installing light machinery. Against the vigorous and determined protest of the engineer, the ships seem to be built for the hour of the contractors' trial, rather than for the day of battle. From the standpoint of the quarterdeck, the modern battleship may seem to possess endurance and strength, but from the view of those beneath the protective deck this strength is more apparent than real. It will be found in the next naval war that in the distribution of weights allowed in the construction of a modern war vessel, there has been too great a tendency to sacrifice the efficiency of the machines that are not within sight of the inspection officer, in order that the appliances above the protective deck may be made more efficient and that even luxuries may be secured.

"It requires a resourceful and intelligent man to stand behind the modern gun, but it requires equal intelligence and skill to stand in front of the modern boiler or operate a high-speed marine engine. It will neither promote naval efficiency nor inspire confidence for either the man behind the gun or the man at the throttle to know that the weak line in the naval chain is contained within the engine room, where the smallest factor of safety has been assigned to the working parts, and where the appliances must be subjected to the severest and most continuous strain.

"It is by reason of the condition of affairs existing beneath the protective deck that the modern battleship will do only a small measure of work that will be expected of her when the ship is assigned for distant operations. The larger the size of the battleship, however, the more satisfactory will be her performance, for every increase in displacement means a proportionate and relative increase in engineering efficiency."

Showing the effects of a tremendous battering from the sea, the Deutschland of the Hamburg-American Line arrived in New York last Saturday, 6 days, 19 hours and 28 minutes out of Cherbourg. One of her ventilators was torn away, a good chunk of the starboard rail of the hurricane deck was ripped out, a life boat was smashed and mast and funnel ropes were badly strained. Tons of water constantly piled over the steamer; the storm was, in the opinion of the ship's officers, the worst they had ever encountered on the ocean; and yet the Deutschland's average speed for the trip was 19.33 knots. Ten years ago there was not a steamer afloat that could average 19 knots in even a smooth sea. Such is the triumph of the naval architect and marine engineer.

LAKE FREIGHTS—ORE SHIPMENTS.

The announcement that 980,225 tons of iron ore was moved from upper lake docks to May 1 of this year as compared with 1,854,902 tons moved to the same date a year ago is not taken as an argument of special force on either side of the lake freight market. Of course the decrease in April shipments is large but not as large as was expected. An output of nearly a million tons to May 1 of this year was not looked for, and it is admitted that the loss in shipments can readily be made up before the season is far advanced unless there is a greater demand than has as yet developed for vessels in lines other than ore. At this time a year ago the ore mines were up to the full limit in output, but they have been slow in forwarding ore to the shipping docks since the opening of navigation this spring, and even the contract vessels are not being urged to get around for their cargoes. If it were not for the very heavy volume of coal shipments the vessel owners who have ore contracts on the 85-cent head-of-the-lakes basis would probably feel that they are well off. It is possible, however, that various circumstances connected with the starting of mines, railways and docks in the upper lake region are delaying the full volume of ore shipments and that the situation will change shortly. There is nothing as yet to indicate a change from the ore rates fixed at the opening for both contracts and single trips—85 cents from the head of the lakes, 75 cents from Marquette and 65 cents from Escanaba.

Some soft coal to be carried throughout the season has been placed with three or four vessel agencies in Cleveland at 40 cents to Lake Superior and 50 cents to Milwaukee, rates that are the same as those paid for single trips, but the amount is not large. The big coal concerns are slow in making contracts, which it is expected will all be made at the rates just named.

NEW PRESIDENT FOR TOWING COMPANY.

Mr. Harry Coulby has been selected as president of the Great Lakes Towing Co. in place of Mr. T. F. Newman, resigned. Mr. Newman had been the general manager of the Cleveland & Buffalo Transit Co. as well. On Monday the directors of the steamboat line met and adopted a resolution requesting Mr. Newman to give his undivided time to the steamboat line, offering, as an inducement, a substantial increase in salary. Mr. Newman is primarily a transportation manager. He was with the Detroit & Cleveland Line before the Cleveland & Buffalo Line was started. He decided to meet the wishes of the directors, and accordingly resigned as president of the Great Lakes Towing Co. All was not well within the ranks of the towing company. The company has had a turbulent career for two years past and has suffered seriously from labor troubles. This disturbance was aggravated by lack of harmony among the officers. President Newman and General Manager Sinclair could not get along together and the upshot of it was that both of them sent their resignations to the directors. The necessity of accepting Mr. Newman's resignation later became imperative owing to the action of the steamboat company. Mr. Sinclair's resignation was not acted upon, as the directors in electing Mr. Coulby to the presidency placed the management of the company entirely in his hands. He is empowered to appoint all his assistants. He is regarded as an excellent man for the place, as he is of a very practical turn of mind and has had much experience. He will give a great deal of time to the towing company, but, of course, he will not be required to surrender his present position with Pickands, Mather & Co., where he is in general charge of vessels and the movement of coal and ore.

FROM THE HEAD OF THE LAKES.

Duluth, Minn., May 6.—Contracts are being closed between the Superior Ship Building Co. and the Great Northern Power Co. by which the latter will furnish electrical power for the operation of the ship yard's machinery. The power company is now closing contracts for its electrical and hydraulic machinery, to be ready for installation early next spring, and will soon let its canal and other local contracts with the idea of having the power ready by July, 1904. Contracts for about 10,000 H. P. immediately and 22,000 H. P. later have been settled upon with the street railway and electric light companies of Duluth and Superior. The company also expects to furnish power for coal docks, which are being equipped for electrical transmission, and to transmit power by wire to the mines of the Mesabi and Vermillion ranges.

Large quantities of lumber from mills not situated on the harbor front will be shipped east from here this summer. This all comes in by rail and is handled over the Northern Pacific docks here. A consignment of west coast timber is now coming in, and the mills at Ely and Tower will probably ship 50,000,000 to 75,000,000 ft. this way. Some of this will go to ships from docks at Two Harbors, but most will come to Duluth. Pulp wood shipments to the east from here and north shore points will amount to not far from 100,000 cords this year. Not much is shipped in rafts. The bulk of the product is loaded on scows and small steamers and hauled in that way.

A reduction in the lake and rail flour rate from the northwest amounting to 4 cents a barrel, has been made by the combined lines, to take effect May 11 and to cease Sept. 30. This is in response to the general closing of mills throughout the northwest and to the cry of discrimination against flour and in favor of wheat. Of course there was no discrimination, and wheat shipments are at the low rate quoted merely on account of conditions in the bulk freight market. Flour shippers seem to have the idea that the flour and wheat rates are made in the same way and are governed by the same conditions and authorities, which is well known to vessel men to be an unfounded supposition. They have, however, been able to secure a reduction that cuts off most of the difficulty they have been in. As a matter of fact this difficulty has been the result, simply, of the fact that Minneapolis millers have been too greedy for wheat and have been paying several cents too much for it all this crop. While the natural Minneapolis price for wheat is about 2 cents under Duluth, they have been bidding several cents over, and have accumulated a line of wheat too expensive to make flour of.

Captains M. Ryan, E. S. Smith and G. E. Brooks, who have bought the small steamer J. C. Suit, will very probably use her all season in trying to recover wreckage from sunken and stranded vessels in different parts of the lakes. Their first venture is a search for wreckage at Menagerie reef, Isle Royale, where the steamer Harlem spent a winter recently. They will also investigate the wreck of the Fern, which went down off Copper Harbor two years ago. The Fern at the time of the wreck had just gone from stripping the wreck of the old Duluth & Port Huron liner Colorado, which had gone down off the western end of the Keewenaw point canal, and had recovered some valuable machinery. While rounding the point after the stripping, the Fern was wrecked and all her cargo was lost. The new wreckers hope they will not have a duplication of the original trouble. The Suit may go into the lumber trade in the fall.

S. A. Kemp, formerly secretary of the Duluth board of trade, has resigned and has taken a place in the office of the Union Transit Co. under Mr. Lansing R. Robinson.

John P. Gordon, at one time agent of the Northern Steamship Co. at Duluth, has returned and is agent of the Lehigh Valley Line here.

Capt. D. D. Gaillard, for some time engineer in charge of government works on Lake Superior, has turned his office over to Major L. H. Beach, who takes the place temporarily. Capt. Gaillard goes to Washington as a member of the engineer staff.

All of the 100,000 bu. of flax that broke out of the Peavey concrete elevator on Rice's point has been recovered and the broken corner of the structure will be rebuilt at once.

SPAN OF THE DETROIT RIVER BRIDGE.

The attention of President William Livingstone of the Lake Carriers' Association has been called to an interview with George S. Morrison, bridge engineer, on the proposed international railway bridge. Mr. Morrison being quoted as saying that the 700-ft. spans would be long enough, as the channels at the Lime Kilns is only 600 ft. wide.

"Such a statement is absurd," said Mr. Livingstone. "Every vessel man and intelligent shipper knows that, owing to the enormous increase in tonnage during the last five or six years, the present crossing at the Lime Kilns is entirely inadequate. It is a very dangerous crossing, and the greatest possible care has to be taken by all large vessels passing through it, all but the smallest, in fact, making the passage under slow check. Perhaps Mr. Morrison does not know that the government engineers, fully realizing the inadequacy of the Lime Kilns channel for its present tonnage, have surveyed the east and west sides of Grosse Isle for the purpose of locating another channel, the intention being to have one for up-bound and the other for down-bound traffic. It would also appear, when he talks about 700-ft. spans, that he has not read the bill introduced by his own people in congress, providing that the minimum length of spans shall be 1,200 ft. By inference, at least, it would seem as if Mr. Morrison desired to convey the idea that it is quite an engineering feat to build a bridge with much of a span.

"When Grover Cleveland was president he appointed a commission of five to report on the feasibility of bridging the Hudson river. The commission consisted of army engineers and

engineers in civil life. They finally reported that it was feasible and practicable to build a bridge across the Hudson river with a single span of 3,000 ft., carrying six railroad tracks. Mr. Morrison was one of the five engineers who signed that report, a copy of which can be secured by anyone from the department at Washington.

"Now, in view of the national reputation which Mr. Morrison possesses—and justly so, as he has had perhaps more bridge-building experience than any other engineer in the United States—it seems the height of absurdity for him—if such is his intent—to attempt to throw dust in the eyes of the public as to the great difficulties in building a bridge with much of a span. That the longer the span the greater the cost is true, but as a matter of fact, if the Michigan Central location should be selected, which is the narrowest part of the river, at say the foot of Twentieth street, it would only require a span of about 1,650 ft. to bridge the entire river at that point; that is, putting both abutments out to the edge of the channel bank on each side. If the plans of the railroads are reasonable I do not apprehend there will be any particular trouble in carrying them out, but if they should be unreasonable, then conditions will be different. I shall not discuss the matter any further until the railroads have made up their minds where they want the bridge and how they want to build it, with all their demands clearly cut and defined. It will be time enough then for the lake carriers to decide on their own plan of action."

ORDER FOR A BIG FREIGHTER.

Last week the Review mentioned that negotiations were under way between Cleveland parties and the Columbia Iron Works, St. Clair, Mich., for a steamer which in dimensions would be the largest vessel on fresh water. This contract has since been closed by Mr. M. A. Bradley, Capt. M. Mulholland and other Cleveland investors. The new vessel is to come out next spring and is to be of the following dimensions: Length over all, 500 ft.; keel, 480 ft.; beam, 52 ft.; depth of hold, 30 ft., with a 6-ft. water bottom. She will be built on the 3-ft. frame space system and will have fifteen hatches, each 9 ft. long. Her motive power will consist of triple-expansion engines furnished with steam from three Scotch boilers. This is the first vessel that Mr. Bradley has ordered since 1893, though at one time his vessel fleet was the largest on the lakes. This new steamer will be 2 ft. longer than the quartet built by the American Ship Building Co. and named Gates, Hill, Edenborn and Elwell.

AROUND THE GREAT LAKES.

Hughes Bros. & Bangs have resumed work upon the eastern extension of the Cleveland breakwater.

Capt. Robt. R. Graves of Geneva, O., died Tuesday at the home of his daughter in Canton, Ohio.

The Buffalo Dredging Co., Buffalo, has begun work on an $800,000 contract. It consists of a channel 350 ft. wide and 23 ft. deep in Niagara river.

Notwithstanding the several causes for delay in April navigation, Buffalo received during the month 14,000,000 bu. of grain and shipped 344,097 tons of coal.

The old revenue cutter Fessenden, which has done duty on the lakes for a great many seasons, started this week to Baltimore. She will be replaced by the Tuscarora.

Secretary-Treasurer H. C. Barter of the International Longshoremen, Marine & Transport Workers' Association has issued the call for the twelfth annual convention of the organization to be held at Bay City beginning Monday, July 13.

The steamer S. N. Parent, first of the vessels of the Great Lakes & St. Lawrence River Transportation Co. to be finished at Detroit, is now in commission. Her first cargo will be a load of stone from Kelley's island to the head of the lakes.

Work has been resumed on the new life-saving station at Chicago, which will be located at the river's mouth on the extreme north end of the south government pier. The new station, when completed, will have cost $22,000. It will probably be finished by Aug. 1.

Submarine boat A2, built for the admiralty, was launched last week by Vickers, Sons & Maxim from their yard at Barrow. This is the largest submarine yet built for the admiralty, being larger than A1, and embracing many improvements, the outcome of recent experiments made at Portsmouth. Two other submarines of similar size are in course of construction.

At what is known as the fast coal loading plant of M. A. Hanna & Co. at Ashtabula, thirty-six 50-ton car loads of coal (hopper car kind) were emptied into the steamer Joliet in 60 minutes on Wednesday last. The car-dump machine of the Pittsburg Coal Co. at the same port put 7,200 tons of coal into the steamer Admiral last Saturday in 9 hours, 20 minutes.

Capt. William Leslie of the Collins Bay Rafting & Forwarding Co. has applied to the Dominion government for a bonus to keep his steamer, the Petrel, and a wrecking outfit at Cape Race so that immediate assistance can be given to vessels that get into trouble in that locality. A wrecking station is needed in the gulf and it is likely the request will be granted.

At a meeting of the executive committee of the Lake Carriers' Association in Cleveland, Tuesday, it was decided not to fix the annual dues until later in the season, but an assessment of 2½ cents a ton was made. All the tonnage for which stock was subscribed has not been formally enrolled as yet, but it is estimated that upwards of 800,000 tons will be entered upon the books of the association for the year.

Eastland, the new steamer building for the Michigan Steamship Co. at the yard of the Jenks Ship Building Co., Port Huron, Mich., was launched on Wednesday of this week, Mrs. J. C. Perue naming her as she took the water. The steamer's dimensions are: Length 279 ft., beam 38 ft., depth 22 ft. 8 in. She is designed for a speed of 20 miles an hour.

It is expected that the Barry steamers Empire State and Badger State, which are to be operated between Cleveland and Detroit in opposition to the Detroit & Cleveland Navigation Co., will be in service with the close of the present week. The Badger State will be commanded by Capt. Henry Shackett of Marine City, Mich. Capt. Joseph Lamoreaux will retain command of the Empire State. The vessels have been put in the best possible shape.

Announcement is made of a change of dock superintendents in the employ of M. A. Hanna & Co., occasioned by the resignation of H. T. Raser, who was superintendent of the Erie & Pittsburg Ry. dock at Erie. W. H. Havens, who was sent to Ashtabula three years ago from the Cleveland office as successor to the late George B. Raser, is transferred to the Erie dock and J. M. Amsden, for several years Ashtabula cashier for the company, is made superintendent at Ashtabula.

Capt. Michael Madden, whose death was announced from Saginaw a few days ago, was well known to vessel men in all parts of the lakes. He was born in London, Ont., forty-six years ago. Saginaw had been his home since he was about twenty years of age. Capt. Madden commanded the steamer C. H. Green for several years and was also in the Ohio. Last year he was in command of the steamer Shores and was part owner of her. He is survived by a widow and three children.

United States District Judge Swan of Detroit has just handed down an opinion in the libel case growing out of the collision of the steamer Crescent City with the steamer John Trevor and barges 118 and 131 in St. Clair river in August, 1899. The court awards the American Steel Barge Co., the libellant, $10,400 damages against the Minnesota Steamship Co. The owners of the steamer Maricopa and barge Manila are awarded $5,200 damages against the American Steamship Co., the intervening petitioners and owners of the Crescent City. The court dismisses the American Steamship Co.'s petition against the Trevor and barge 131.

Major W. L. Fish of Detroit, United States engineer in charge of the lake survey, announces that he will soon begin a systematic re-examination of the western end of Lake Erie for shoal spots and obstructions. The survey boat Williams will be assigned to the work. Several boats have struck in these waters, and the engineer is satisfied that there are shoal spots not marked on the present charts. The steamer Lorain will be sent to sweep the Straits of Mackinaw for shoals in the vicinity of Waugoshance. The search will be extended to the entrance of Green bay and the Rock island passage entrance. Lake survey steamer No. 1 will be reserved for harbor work.

An important dock transfer has just been made at Ashtabula. The Minnesota docks, the property of the Pittsburg Steamship Co., but under lease to Pickands, Mather & Co., have been worked for several years by the Ashtabula Dock Co. These docks comprise the frontage on both sides of the lake front slip and by the new arrangement, the west side reverts to the trust and will be managed by J. E. Savage, also superintendent of the Superior dock. This portion of dockage includes three sets of Hoover & Mason clam shell machines and ten Brown hoisting and conveying machines in its equipment. Ed. S. Henry, local superintendent for Pickands, Mather & Co., retains the superintendency of the remaining portion which has twelve Brown machines and one car dump machine. The change was effective Tuesday.

Negotiations are practically concluded for the transfer of the steamer Easton, belonging to the H. W. Williams Transportation Co., to the White Line Transportation Co. of Duluth. General Manager W. H. Singer of that company made an examination of the steamer at South Haven over Sunday and admitted that she filled the specifications better than any other passenger steamer now available. The Easton was bought by H. W. Williams at Baltimore three years ago for $60,000, but neither of the parties to her last transfer would give out the sum at which she is to change hands. The Eastern is needed for the tourist trade in the White line, and must cover in short time a large triangle between Duluth on the west Houghton and Hancock on the east and south and Isle Royale and Port Arthur on the north and east. The addition of the Easton brings Chicago within thirty hours of the famous Nipigon river country by making direct rail connections at Houghton.

The naval board, composed of Commanders Perry, Bailey and Canaga, appointed to examine the battleship Maine, has made a preliminary report which is very interesting to the authorities. They find that the water-tube boilers can be repaired at a cost of about $10,000. It is recommended, however, that appliances be fitted to turn off the steam from any section desired from a position on deck, thus reducing danger of scalding. The turret supports have been found defective but they can be strengthened without heavy outlay. The department is pleased that this weakness has been discovered because it enables it now to correct the plans for the big battleships under way.

KEEP AN EYE ON CANADA.

Buffalo, May 5.—In these days when the individual ship owner is more than ever apprehensive that he is losing ground that he is not to regain there is especial attention attracted to Canada, whose marine is very plainly in better condition than it has been of late and which gives promise of still better things as the special effort to foster it bears fruit. It is not expected that anything approaching the proportions of our fleet can be realized and yet the improvement is such that we may well give it attention.

The recent throwing off of the Welland canal tolls will certainly be a lesson to New York state, which is seriously considering the policy of restoring her canal tolls to enable her to meet the extra running cost of the new barge canal, which seems to be accepted as a certainty. When we consider the money that Canada has spent on her public works and note the cheerfulness with which these outlays are increased we are amazed that a country with fewer people and much less wealth and developed resource than New York can do these things and yet not appear to feel the burden.

Said a marine man the other day: "We are going to see, and not very far away either, the day when Duluth as a grain shipping port will be eclipsed so far by Fort William that it will not be classed with it. I say this in spite of the fact that I am largely interested in Duluth and have no interests at Fort William. The tendency is all in that direction. Canada has seen it and is furthering it by building a great elevator system at Fort William."

If this storage center can bridge over the dull midsummer season in the Canadian trade, which is the feature most feared by vessel owners, it will add much to the possibilities of the route, for it seems to be admitted that it is cut in two in July decidedly more than is the case on this side. Whether this is true or not the shifting of the grain-receiving center from Duluth to a Canadian port is a serious matter and may well claim the attention of our customs authorities. So set is the governing power here against the admission free of Canadian grain that it may be found impossible to meet the pretensions of Fort William by throwing off the duty.

There is no doubt that the possibilities of the St. Lawrence route are to be tested to the utmost just as soon as possible. The new American line to Quebec will be assisted in every way known to government, not individually, of course, but along the lines mapped out in general. It is said to be a rare sight to go down the St. Lawrence from Ogdensburg. There are so many gas buoys marking the channel that one can fairly step from one to the next and this is a mere preliminary to the establishment of beacons which are to light the route fairly all the way to the ocean.

While the new American line did not make much of a demonstration last season of what it could do and is not likely to get very far this season on account of the slow movement of work in the ship yards, the new fleet of ten steamers will all be ready some time this summer, and the advantage of craft built especially for the route ought to be considerable. None of the steamers are yet ready, but there ought to be one ready at the Buffalo yard and another at Detroit this week.

There seems to be no doubt in the minds of those interested in this new line that the St. Lawrence route is to be permanent and that it is going to pay well. Already the line has done one thing that ought to win recognition in Canada. When winter was coming on last year and Quebec was without sufficient coal the line fairly saved the city by carrying 15,000 tons down from Ohio. There was 60 cents duty and 40 cents canal tolls to pay. but the coal brought $8.00 a ton. And now Canada has turned about and dropped the toll off. The decision was not reached till the other day, but assurances amounting to a promise were made last fall, it is said.

Capitalists at Hamilton, who brought over the British steamers Strathcona and Donnacona, are now importing a third, the Wexford, which is supposed to be already on this side. She is not full Welland canal size, but is said to be a good carrier.

So it appears to be up to us to do a little figuring and make some outlay to continue our lead on the lakes. Too bad that the interests should be divided, but so long as it is we must do our share that makes for competition. This means the Erie canal enlargement, which must be given a longer season than the old canal ever had to meet the handicap of the short season on the St. Lawrence.

CANADIAN SHIPPING NOTES

In order to encourage the construction of dry docks at suitable ports the Dominion government has raised the subsidy to 3 per cent. upon the cost of the work, which sum is payable for twenty years after the completion of the work. It is now expected that work on the proposed dock at St. John, N. B., in which G. Robertson, M. P. P., is largely interested, will be proceeded with and proposals are also being made for a dock at Halifax, N. S., one at Montreal and another on the Pacific coast, for deep sea ships. On the great lakes additional dock accommodation is required, notably at Toronto and on Georgian bay. The enlargement of the Collingwood dock is not regarded sufficient to answer the requirements of Georgian bay. A dock is needed on Lake Superior, either at Sault Ste. Marie or Fort William.

The Dominion Transportation & Towing Co., Ltd., has been incorporated under the Dominion companies' act to carry on a general navigation and ship broking business in Canada and elsewhere; and to engage in wrecking, lightering and towing. The company will have its headquarters at Halifax. The incorporators are E. VanBuskirk, H. G. Bauld, R. H. Humphrey, E. J. Longard and H. C. Borden of Halifax.

The Canadian Towing & Transportation Co. has been incorporated under the Dominion companies' act with offices at Montreal, to carry on a general navigation business in Canada. The incorporators are: A. E. Pontbriand of Sorel, Que.; P. Leteudre of St. Michel d'Yamaska, Que.; A. Lomer and A. Waud of Montreal; and W. Byrne of Prescott, Ont.

An order for the construction of a new wharf, 500 ft. long, at a cost of $200,000 at Quebec, has been let by the Dominion department of public works to Dussault & Lemieux. This is part of a large scheme of dock extension at this port in order to meet the necessary demands for wharfage for ocean going vessels.

In addition to building the machinery for the steamer Westport, the Burrill-Johnson Iron Co., Yarmouth, N. S., is constructing the engines and boilers for a freight and passenger steamer for St. Pierre, Miquelon, and a freight steamer for J. W. Hutt of Liverpool, Nova Scotia.

It is expected that the Inland Lakes Transportation Co. will have three steamers in service on the upper lakes early in July. These steamers are to come out from Great Britain, and will be cut in two in order to pass through the canals.

Capt. R. Cox, well known in Nova Scotia waters, has been appointed to the command of the Vidette, the Dominion cruiser on the Yukon river. The two launches hitherto maintained for police work on the river are to be sold.

During the year 1902 there arrived at Sydney, Nova Scotia, 2,730 vessels having a registered tonnage of 1,418,939 tons, of which 745 were ocean steamers registering 1,117,511 tons register. Of these steamers 176 called for bunker coal.

The Cape Breton Steamship Co. is being organized at Sydney, Nova Scotia, to operate steamers coastwise. Capt. Peters of Sydney has gone to England to purchase a suitable steamer.

The Trent Valley Navigation Co., of which W. T. C. Boyd of Bobcaygeon, Ont., is president, has purchased the steel steamer Empress.

The tug Viper has been sold by W. Cullis of Bruce Mines, Ont., to the Lake Superior Lumber Co. of Port Arthur, Ont.

REGARDING CLEARANCE OF VESSELS.

The following letter from the secretary of the treasury to the collector of customs at Cleveland will be of interest to vessel owners:

"The department is in receipt of your report dated April 3, 1903, relative to the American screw steamer Harvey J. Kendall, which vessel took out a clearance at Port Huron, Mich., for Raber, Mich., and there loaded a cargo for Cleveland, O., to which port she proceeded without reporting at Detour, which she passed within 1½ miles upon her southerly course. She also passed within 1 mile of Port Huron. There is no custom house at Raber, which is within the Superior district, but an officer is stationed at Detour, which is also in the district of Superior. You contend that the vessel should have reported either at Detour or Port Huron, and that she had no legal right to go north into another district, and then to turn south and pass through the district from which she cleared without again clearing. Section 3118 of the revised statutes requires the master of a vessel enrolled and licensed, before departing for a port in one collection district to a place in another collection district where there is no custom house, to file his manifest and obtain a clearance and make oath to the manifest, and to deliver such manifest and clearance to the proper officer of the customs at the port at which the vessel next arrives after leaving the place of destination specified in the clearance. In the present instance the vessel did not arrive, or touch, at Detour or Port Huron, or at any other port until her arrival at Cleveland, where the master delivered the manifest and clearance to the proper officer of the customs. It seems to the department that it would impose a hardship on such vessels to require them to break voyage for the purpose of reporting, when such purpose would be satisfactorily subserved by the report of the ultimate destination. Section 3117, revised statutes, provides expressly for vessels touching at intermediate ports, and allows them to take on cargo and depart without their reporting or clearing, if the master enters his cargo upon his manifest. Section 3122, revised statutes, allows a vessel to depart from a place at which there may be no custom house to a port where there may be a custom house but requires the master to deliver manifest at the port of destination. The port of destination in such cases is the port at which a vessel arrives in due course of business, and not a port through whose waters she may have to pass in order to reach her destination. The present system of filing supplementary manifests at the port of final discharge on the lakes provides for information upon which to base statistical returns, and does not seem to afford any particular opportunity for fraud on the revenue. The department concludes that the course pursued by the steamer Harvey J. Kendall was in accordance with law, and that no fine was incurred by her in the case, under section 3124, revised statutes."

The Hardy ship yard at Tacoma, Wash., has been leased to the Puget Sound Iron & Steel Works of Tacoma. Immediate possession is given.

AMERICAN INVESTMENTS IN CANADA.

Mr. Joseph L. Bittinger, consul general at Montreal, has sent to the state department at Washington a report upon American investments in Canada, showing how resources of the dominion are being exploited by Americans. He says that never in the history of Canada has the industrial outlook been so bright as it is today. The present year promises to be made memorable by the establishment of new and immense enterprises and the extension of many existing ones. Greatly increased transportation facilities are contemplated; the Grand Trunk Pacific and the Canadian Northern will stretch from the Atlantic to the Pacific, both lines running far north of the present Canadian Pacific line. The Canadian Pacific is to add a line of ships between Quebec and London, Liverpool and Glasgow. The two other transcontinental lines, as soon as completed, will also have connecting steamship lines from St. John, New Brunswick, to English ports.

"Within the past few months," says the consul general, "the following investments have been made by Americans:

"Five thousand shares of the Royal Bank of Canada, located in Montreal, have been purchased at $250 per share by a syndicate of capitalists made up of Marshall Field of Chicago; John J. Mitchell, president of the Illinois Trust Co. of Chicago; Norman B. Ream, capitalist of Chicago, director of Chicago & Alton railroad, the Erie railroad, etc.; J. Ogden Armour and P. A. Valentine of the firm of Armour & Co., Chicago; John B. Dennis and E. L. Marston, members of the banking firm of Blair & Co., New York; Geo. F. Baker, president of the First National Bank, New York; James A. and C. Ledyard Blair of Blair & Co., and their friends. The adhesion of such a powerful group of American capitalists makes the Royal bank one of the greatest financial institutions in Canada.

"United States and Canadian capitalists have secured control of the timber limits of Newfoundland. Organization is completed by the Newfoundland Lumber Co., composed principally of New York and Boston lumber operators, and capitalized at $1,000,000. The company has purchased a vast tract of the richest timber land in the colony. The properties secured include the Highland Lumber Co. and the Parrsboro Lumber Co., comprising 350,000 acres, 60 per cent. of which is pine, very large and sound, and comparing favorably with the Ottawa pine. The lands are well watered and the company expects to ship from Exploit bay next spring 10,000,000 ft. of pine to Great Britain, where this wood is steadily growing in favor. The company is now erecting a large sawmill at Norris Arm on the line of the Newfoundland railway, which will largely increase the cut, and it will establish a colony of workmen there. The company also intends to erect large pulp mills, there being a plentiful supply of spruce and adequate water power on the property.

"Another organization of New York capitalists will take over properties aggregating 4,000 square miles in the interior of Newfoundland. This transaction is one of the largest in the history of lumbering in the colony, and practically all the explored timber holdings are now in the hands of American capitalists. The same gentlemen own enormous tracts in Nova Scotia, under the name of the United Lumber Co. The latter concern is just starting to erect a large pulp mill on the Clyde river, Nova Scotia, where it has 3,000 H. P. Mr. Henry Patton, one of the Adirondack operators, is largely interested in the Newfoundland enterprises.

"An American syndicate whose headquarters are at Boston has secured an option on an extensive coal property in Nova Scotia. The areas bonded comprise 21 square miles in the Springhill coal basin, beginning at a point about 5 miles from the present workings of the Cumberland Coal & Railway Co. and adjoining the property of the latter. The price is $100,000. These areas are as yet undeveloped, but the owners are confident that the main basin, the seams of which aggregate 40 ft. in. thickness, will be struck there. The American syndicate has secured calyx drills and is at work. The geological survey of Canada has thoroughly explored this section of country, and last summer Mr. Hugh Fletcher, one of the experts of that service, traced the famous Barlow seam into these areas. Nova Scotia mined last year 4,328,000 tons of coal, an increase over 1901 of 840,000 tons. Of this aggregate, Cumberland produced 500,000 tons.

"F. P. Chappell of New York, representing capitalists of that city, has recently purchased a valuable timber property situated at Bridgewater, Nova Scotia. It comprises 210,000 acres. The price paid was $1,500,000.

"It is reported from Toronto that Thomas A. Edison, the famous American inventor, has recently acquired several nickel mining properties in the vicinity of Sudbury. It is understood that he requires a considerable quantity of this mineral in making his new storage battery. Several applications have recently been received by the crown lands department, and it is surmised that Mr. Edison will construct reduction works in northern Ontario.

"A lumber deal has been consummated, says a Sherbrooke, Quebec, dispatch, whereby the Messrs. H. Lovell & Sons of Coaticook, have disposed of their timber property and mills in Gaspe Basin. The price is $100,000 and the sale comprises 34,000 acres, mills, and all equipment. The purchasers are Americans from Buffalo, who are largely interested in pulp wood. The lumber cut during the winter remains the property of Messrs. Lovell & Sons, but will be taken over by the new company in the spring at a price to be agreed upon.

"A syndicate composed of William H. Nichols, president of the Nichols Chemical Co.; Jacob Langloth, president of the American Metal Co.; and George Martin Luther, general manager of the Nichols Chemical Co., all of New York; and Clement S. Houghton, financial agent of Boston, have purchased 125,000 shares in the Granby Copper Co., Consolidated, and the above have been made directors therein.

"The Sherwin-Williams Co. of Cleveland has purchased 120,000 ft. of land on Atwater avenue, Montreal, on which the company intends erecting extensive paint works. The works will employ a large number of hands and will be equipped with the most modern machinery. The purchase price was $20,000.

"It is learned from Quebec that Mr. James L. Newton, Watertown, N. Y., closed a deal with the provincial government, through which he became owner of two water powers on Pentecost river in the lower St. Lawrence and adjoining land, for $13,500. The water powers are 70 and 54 ft. high, respectively, and are considered very valuable properties, as they are situated in a great lumbering district. Mr. Newton intends forming a syndicate to manufacture pulp and timber, and will begin operations as soon as navigation opens.

"From Quebec I learn that the great timber limits and mill properties formerly owned by Gaynor Bros., consisting of 181 square miles on the Pentecost river, have been purchased by Mr. John McLellan of Syracuse, N. Y. The timbers and properties are stated to be among the most desirable in this province.

"It is announced from St. John, N. B., that a strong company has been formed there to manufacture aluminum. James Robinson, M. P., is at the head, but the principal stockholders are American capitalists from New York. The capital is to be $1,000,000, and the plant will comprise a factory at St. John and works at Grand Lake, which is the source of the raw material.

"The city of Guelph, Ont., is to have a new iron and steel industry, a number of manufacturers in Montreal and in New York state having organized a company to be known as the Page-Hersey Iron & Tube Co. with a capital of $500,000. It will manufacture and deal in iron, steel and other metals, and the head office will be in Guelph.

"Plans have been submitted to the Dominion department of railways for a tunnel under the St. Lawrence river, to connect Montreal and Longueuil, Que. The plans provide for a double-track tunnel from the south shore into the heart of Montreal, where a central station will be located. The width will be 27 ft. and the height 21 ft. Its gradients will be 1½ to 2 per cent: and its greatest depth will be 15 ft. below the mean level of the river bed. The structure will be of concrete and stone masonry, with a lining of enamel brick. American capitalists are to furnish the money.

"The Brockville, Westport & Sault Ste. Marie Railway, which has been purchased by a syndicate of American capitalists for $160,000, runs from Brockville to Westport, Ont. Brockville, the county seat of Leeds county, is on the St. Lawrence river, at the end of the Thousand islands, and is a fine town, having electric lights, gas, sewer and all modern improvements. It is only ten hours (365 miles) from New York and all the villages along the route of this railroad are prosperous, the country being one of the most productive in Ontario. The syndicate which purchased the road is wealthy, including such men as Henry von Minden, president of the United Wine & Trading Co.; W. F. Nencken, treasurer of the American Exchange Cigar Co.: Gustave Schock, millwright; Val. Schmitt, president of the Federal Brewing Co., Brooklyn; Charles H. Holm of Holm & Smith, attorneys; and William Volk, director of the United States National Bank, New York.

The Great Lakes & St. Lawrence Transportation Co., an American concern, is building ten vessels to be operated between Duluth and Quebec. The dimensions of the vessels are: Length over all, 255 ft.; keel, 241 ft.; breadth, 41 ft.; depth, 18 ft.; to carry 2,200 tons on a 14 ft. draught. Six will be fitted with triple-expansion engines, with cylinders 15, 25 and 42 in. in diameter and of 30-in. stroke, to which steam will be supplied by two Scotch boilers, 11 by 11 ft., tested to a pressure of 170 lbs. to the square inch; the other four will be fitted with triple-expansion engines, with cylinders 14, 25 and 42 in. in diameter and 30-in. stroke, to which steam will be supplied by Babcock & Wilcox water-tube boilers at 225 lbs. pressure to the square inch. The value of each steamer is placed at $150,000. Three of the steamers are being built at Chicago, three at Detroit, two at Superior, and two at Buffalo. Delivery of all is to be made before the end of June."

Charles Fletcher's beautiful steam yacht Carmina was launched from Lawley's ship yard, South Boston, Mass., last week. She was designed by Mr. A. S. Chesbrough of Boston and was named by Miss Harriet May Fletcher. The Carmina is 170 ft. over all, 139 ft. 9 in. on the water line, 22 ft. beam and 10 ft. 6 in. draught. She is beautifully fitted up between decks in mahogany and white enamel. In the forecastle are the berths for the crew and just aft of these five officers' rooms. Further aft come a shower room, mess room, lavatory and galley. The owner's quarters, stateroom and bath and five staterooms and bath for guests are aft. She is intended to be a speedy and comfortable cruiser.

LIFE IN THE REVENUE CUTTER SERVICE.

Romantic and picturesque smugglers of the coast, who plied their dangerous work of luring ships on the rocks by false beacons, have practically disappeared from North America, and with the best lighted and patroled coasts in the world there is little opportunity for these latter-day pirates to operate. The little smuggling that is carried on is of a petty nature, and consists chiefly in carrying a few goods across the Canadian boundary by small peddlers and tradesmen. Occasionally a sloop or fishing schooner is fitted out in some Newfoundland or Canadian port with a small cargo of goods, and after loading up with dried or salted fish to conceal the real nature of her business, she will attempt to make the run to some American port on the Atlantic coast to discharge her dutiable cargo. But such experiments are of the most risky and adventurous character and the alert revenue officers discourage a second undertaking in the most efficient way. It is rarely that such a load of smuggled goods passes inspection and reaches its destination without being seized.

The smuggler has thus been practically eliminated from the ocean, and if he operates at all it is chiefly on land. Considering the vastness of the American seacoasts and the width of the great oceans which wash either shore, this is no small accomplishment for the revenue service. From the northern coast of Maine to New Orleans, the coast is patrolled by revenue cutters, the duties of which are primarily to prevent or stop smuggling, and, secondarily, to look after the general interests of shipping and shipwrecked mariners. On the Pacific coast the revenue patrol extends from Alaska to Mexico. The duties there are somewhat different from those demanded on the Atlantic coast. The revenue officers act as policemen at the international boundary, where the seal and whale fisheries are constantly causing disputes, and in some of the isolated fishing hamlets and villages they act as health boards to stamp out smallpox or other contagious diseases.

Smuggling would undoubtedly quickly flourish again along the extensive seacoasts if eternal vigilance was not exercised by the revenue cutters. In the past twenty years some gigantic plans for smuggling have been frustrated by the modest young officers connected with the service. Their detective and police work has proved so successful that unlimited praise should be bestowed upon them. The fact that the high seas are safer today from robbers, pirates, and smugglers than the streets of large cities is evidence that the revenue officers perform their duty without fear or favor.

The revenue cutter actively employed in patrolling the coast has a large beat, extending hundreds of miles along a shore indented by scores of sharp coves, bays, and sounds suitable for smuggling purposes. A glance at a map of almost any section of the country will show how difficult it must be for the revenue cutters to patrol every part of it. There are hidden bays and coves where cluster legends of shipwreck and smuggling in the days before lighthouses cast their warning lights far out to sea; high, rocky headlands where many a good ship has tripped in the darkness and struggled vainly against wind and wave to escape the relentless clutch of the sea; stretches of sandbars and treacherous shoals and rock-ribbed, desolate islands where unfortunate seamen have starved and waited in vain for help to come. All of these desolate places the revenue cutters are supposed to visit at regular intervals. After each heavy storm the exposed parts of the coast must be visited to pick up shipwrecked sailors or to report disabled barks. No fishing hamlet off the coast is too small or insignificant to be ignored.

Time and again the revenue cutters have proved the salvation of whole colonies of fishermen. Cut off from the rest of the world by high tides and hurricanes, with their homes flooded, and in some instances washed out to sea, the inhabitants have starved and frozen until the welcome revenue cutter appeared with clothing and food.

In this work of humanity and mercy the revenue service may be said to be a complement to the lighthouse service. The latter warns and directs the mariner, and the former goes about to pick up and succor the shipwrecked, who in spite of warning signals have fallen afoul of rocks and shoals. All through the days and nights immediately after a storm at sea the revenue cutters steam up and down the coast hunting for wrecks or disabled craft. Every part of the coast is carefully examined, and the paths of commerce are followed to find drifting derelicts. These floating menaces to commerce must be speedily located and destroyed, or they may cause the sinking of some large ocean steamer with its hundreds of passengers on board. When a derelict is discovered it is either towed by the cutter to some neighboring harbor or blown up by the cutter's guns or dynamited.

The equipment of the cutters is probably the most complete of any class of government boats. Besides guns and dynamite apparatus for blowing up derelicts or for attacking smugglers, they carry medical appliances for wounded or frostbitten sailors, complete fumigating and disinfectant supplies for stamping out contagious diseases in small fishing hamlets, provisions and clothing sufficient for a whole hamlet of starving and freezing people, and steam, electric and hydraulic machinery for towing disabled vessels at sea.

The latest and most modern of the revenue cutters have the appearance of trim little war vessels, and in times of war they do become members of this branch of the public service. The navy department then employs them as dispatch boats. The Seminole, which is stationed on the New England coast, is a fair representative of this class of boat. She is 188 ft long and can steam 18 knots an hour. She carries three light guns as her peace armament, but she is fitted to carry heavier ones in time of need. Over sixty men make their home on the Seminole. The equipment of the cutter is designed to make the quarters for the crew and officers as comfortable as possible, and the men enjoy the life exceedingly. But the officers and crew are never located permanently in one section. They are shifted around continually, so that they see service in all parts of the country. One season they may patrol the New England coast, and the following find their station moved to Alaska or on the Gulf coast. In this way monotony and discontent are avoided.

An officer who has been in the service a dozen years has consequently seen service on all sections of the coasts, having been successively shifted from one station to another until the whole circuit has been completed. As the duties of the different stations differ very much, the new officer or member of the crew has much to learn. He is not considered thoroughly educated in his work until he has practically been on every station. Very often the revenue cutters on the Atlantic coast are ordered to a station on the Pacific, and the officers and crew take their little craft around Cape Horn and pay visits to unfrequented portions of the southern hemisphere.

The officers of the revenue cutters are graduates of Annapolis or of the schoolship Chase, which belongs to the service and which is continually recruiting young sailors and officers for future work on the cutters. The engineer officers of the cutters are from the different technical schools. The civil service examinations required to enter the revenue service are severe, and require for the different grades quite a wide knowledge of affairs. The officers, besides their technical education, are supposed to know all the matters and rules pertaining to United States customs laws, and those who have been longest in the service are quite well educated in general international maritime law.

In many instances they are placed in positions where they must act as representatives of the government in important matters. According to their acts must often be determined the drift of international disputes. The revenue officer who knows just when to seize a ship of a foreign nation caught poaching on private fishing preserves, and when to draw a fine line of legal distinction between an offense and one that merely approaches to, but does not quite overstep, the boundary, is a man whose services are specially needed in those quarters of the globe where the different nations' interests are apt to clash. Many a revenue officer on the Pacific coast has saved thousands of dollars and endless meetings of committees by discretion of action founded upon a thorough knowledge of international maritime law.

The revenue officer in command of a cutter is thus a policeman, and oftentimes a judge with wide discretionary powers. Some days his duty is merely of a petty, routine character, but occasionally there dawns a day when the best of his intellect is taxed to decide questions of world-wide importance. He has no library to refer to; no helpful legal associates to guide him; but he must reach a decision promptly and immediately of his own will. So thoroughly familiar are these revenue officers with the coast which they patrol that in emergencies they can act as scouts and spies for the navy or other branches of the government. During the Spanish war the cutters were turned over to the navy department, and they were organized as a part of the so-called mosquito fleet. They not only performed great service in this field, but many of their officers acted as pilots on the troopships.

When the smallpox broke out in Sitka, Alaska, a year ago, and threatened to become epidemic throughout the whole of that part of the coast, it was Lieut. Winram of the revenue service, stationed at that port, who had complete charge of stamping out the disease, saving the natives from an epidemic which would have decimated their numbers more than the rigors of the cold climate. Several times the revenue officers in the far north have had to face this scourge and employ harsh methods of exterminating it. The tendency of the disease to spread among the natives in that portion of the globe is so great that revenue officers have absolute police power to take complete charge of any village or town threatened with the disease and to isolate it until the epidemic is checked.

Every season hundreds of lives of starving and freezing sailors are saved by the revenue officers and crews of the cutters. These shipwrecked men are picked up by the vigilant cutters from islands, wreckage, and from ships caught on the rocks or shoals. In the north and south, on the Atlantic and Pacific coast, the disasters of the sea are beyond the prediction or wise prevention of man. The lighthouse service can merely warn the ships off certain rocks, and the life saving station men can only rescue those unfortunates cast upon their particular section of the coast; but the revenue cutter men sail forth to look for them and pick them up from out-of-way places where they have been cast up by the sea.

Life on the cutters is not altogether inactive and monotonous, and in the pleasant summer season there is more of pleasure than of hard duty. The cutters visit port after port, and the men have a few hours ashore frequently. They touch at seaside resorts, and for a short time mingle with those of their kind engaged in pleasure seeking. The revenue officers are always welcome visitors at the different ports and summer places which they touch. Every lonely inhabitant of a lighthouse or lightship hails the cutters with genuine joy. Frequently they are the means of bringing relief to the lonely watchers by the sea. Last

winter, when coal was scarce, a good many of the revenue cutters were employed in carrying coal to the lighthouses, and the anxious keepers of the lights eagerly anticipated the coming of the cutters with the precious fuel to keep them from freezing and their lights from expiring.

In a small ship like a revenue cutter there is a less heterogeneous mixture of officers and men than on a larger war ship, and the men selected for this important part of the government's work are picked with some idea of their congenial fitness for life in restricted quarters. If the men were uncongenial to each other they would cripple the service and produce discord among the ranks. As a rule the officers are transferred to new stations in a body, and it will often be found that the commanding officer, executive officer, and the navigating officer of a cutter have worked together for ten or more years, having received the same assignments for a consecutive number of years on different stations. There is an effort to keep the engineers and the assistants together on the same cutter to make life more agreeable for them. Consequently on a revenue cutter a veritable happy family is to be found in the officers' quarters, while in the ward room mess there is also observable a spirit of congeniality that is often lacking on war ships. One may hear the strumming of a piano or the notes of a guitar or banjo on warm summer nights as the cutter rides at anchor in Newport, Boston or some other harbor. The men are engaged in various ways of self-entertainment, which make their little world independent of all else.

CONDITION OF UNITED STATES SHIP BUILDING CO.

For several days stories have been afloat to the effect that the United States Ship Building Co. was to be re-financed. One story had it that Charles M. Schwab, president of the United States Steel Corporation, who was said to control the company's bond issue, wanted to retire the whole issue of $16,000,000. Another story was to the effect that Lewis Nixon, president of the ship building company, who was said to control the company's stock issue, wanted to retire the common stock. Upon being asked about these stories Mr. Nixon said:

"There is just a slight basis of fact in them. The situation is this: "Every one of our constituent companies is doing all the work it can. We have reached the limit of our capacity, both in repairing and building. The question that confronts us, therefore, is, shall we turn away work, shall we enlarge our plants, or shall we buy new plants? We have offers of several plants but I am not in favor of purchase. I want to build up the plants we now have and provide for the future. Others interested in the company have other notions and at present nothing has been decided on. My estimate is that we shall need about $5,000,000 to enlarge our plants and bring them up to the maximum of efficiency. It is not a large amount of money, but at present it has not been determined whether we shall attempt to raise it or keep the plants as they now are."

In answer to a question Mr. Nixon said that Mr. Schwab controls both the stock and bonds of the company.

EXTRUDED METAL.

Com'dr. Warner B. Bailey's address before the American Society of Naval Engineers upon "Extruded Metal" has been reprinted by the Coe Brass Manufacturing Co., Ansonia, Conn., who are makers of this material in this country and who are now adding to their plant for the purpose of manufacturing it on a more extensive scale. The address is brief and is as follows:

"By the process of extrusion, bars or rods of almost any particular cross section in brass or high tensile-strength bronze are produced, and so accurately that no machining is afterwards required. These special-shaped wrought rods, bars and angles are used in long lengths, or cut up into short sections, and supercede casting for many purposes. The process consists of squeezing the heated metal through dies of almost any desired shape by hydraulic pressure (oftentimes as high as 60,000 lbs. per square inch.) The very high compression to which the semi-plastic material is thus subjected renders it perfectly homogeneous and free from possible casting defects. Its molecules are densely compressed, and the quality must necessarily be greatly improved. Extruded bars or rods consequently possess, in a very marked degree, those qualities which are essential for sound engineering work. Various alloys may be used in this process, but not all of the alloys commonly rolled or cast. In addition to bars or rods of irregular cross section, all stock sizes of round, hexagon, square, rectangular, half-round, etc., are produced, suitable for forging into bolts or for all engineering purposes. Alloys used for this purpose are naval brass, Muntz metal, and other special bronzes suitable for forging. The alloys used for making angles, T bars and special shapes for marine work are approximately the same as naval brass, containing copper, tin and zinc in proper proportions to extrude into these shapes satisfactorily. All such alloys have high tensile strength and are particularly non-corrosive in their qualities.

"A recent test of naval brass extruded rods for bolt stock to be used on the U. S. S. Chattanooga, resulted as follows: Diameter, .875; reduced diameter, .785; reduction of area, per cent., 19.4; elastic limit per square inch, 41,600; maximum strength per square inch, 63,200; elongation in 8 in. per cent., 21.

"A test of an extruded angle of large size for the cruiser Des Moines resulted as follows: Reduction of area per cent., 20; elestic limit per square inch, 33,800; maximum strength per square inch, 80,500; elongation in 8 in. per cent., 18.1.

"The dimensions of the bars produced are limited by the weight of the billet adapted to the extrusion machine. Billets usually range in weight from 150 to 175 lbs., and rods are produced ranging in weight from a quarter of a pound per foot and about ⅜ in. in diameter to sections 10 to 12 lbs. per foot and 4 to 5 in. in width. It will thus be understood that light sections may be had in long lengths and heavy angles in lengths from 12 to 18 ft. The extrusion process of making rods for engineering work insures greater uniformity in the material than ever before possible, and for special purposes alloys may be produced having requisite tensile strength or elongation adapted for the work, even up to the strength of good quality steel, at the same time non-corrosive.

"In addition to the extruded rods in common sizes and shapes, such as rounds, hexagons, squares, etc., T angles, I beams and bulb angles of any description are manufactured for use in hull construction of battleships, torpedo boats and yachts. Many yachts and launches have already been made with the frames entirely of extruded bronze bulb angles in place of steel. The material has also entered into the construction of self-closing compartment doors for ships, ammunition chain rollers, stanchions, and in other places where reliability, strength and non-corrosive qualities are required. The hull of the new cup defender is of Tobin bronze, while the framing is of steel. As bulb angles and beams of sizes up to 6 in. are made by the extrusion process, and as the metal possesses the strength and stiffness of mild steel, it would seem admirably adapted to this purpose. The extrusion process, though new to this country, has been in use for some time in England and on the continent."

LIPTON AND THE YACHTS.

If we believe Schopenhauer, a man's life may be divided into five periods, according to the desires that consecutively fill his soul. First he is longing for pants; second, a watch; third, an angel in pink muslin; fourth, money; fifth, a place in this world.

And so it seems that Mr. Lipton has entered upon the fifth period of his life, the "place" he desires being that of lifter of a rather ugly piece of furniture known the world over as "the cup."

The youngest Shamrock has shown herself speedier than her namesakes, and though dismasted through some weakness in her rigging, and incidentally ruining a small fortune in sails, her owner immediately set about to remedy the mishap, showing a worthy persistence which none will declare to be worthy of a better cause. Those having seen the challenger say that she is quick in stays, faster and more weatherly than her trial horse, and the best boat England ever had.

As predicted in the Review the Reliance had some trial spins during the latter part of April, and any uneasiness caused by reports of the Shamrock's splendid showing vanished with the American boat's initial trip. Said boat's smooth manner of sailing in a 9-mile breeze, with hardly a suspicion of the so-dreaded retarding wave under the counter, was, to say the least of it, a tribute to the builder's skill, while, when going free—the Independence's favorite position—she reminded one of the latter by perceptibly raising her bow. The defender's main sheet is handled below deck, and the double wheel is also an innovation to enable four men to apply their strength on the tiller without standing in each other's way, while the remarkably long outrigger, the extra thickness of the shrouds and the double bobstays give the onlooker a feeling of confidence in her strength, and a belief in the impossibility of seeing the Shamrock's accident duplicated on this side of the Atlantic. Comparing the two contestants it is certain that both are speedy; that the English craft is quicker in stays than the Reliance with her longer fin; that the American boat is stiffer in a strong breeze, and is an improvement on the Constitution when sailing free. Not doubting the reports from the Clyde, that the Shamrock is the best challenger ever built there, Americans feel assured that the Reliance is the best racer ever built here and well qualified to prevent the cup from changing owners.

F. H.

HOME DEVELOPMENT.

Editor Marine Review:—The adoption of the Panama canal route in place of the Nicaragua is attributed to Senator Hanna. That gentleman can render vastly greater service to this nation by securing through an amendment to the canal bill, or in some other form of legislation, appropriations for the construction of deep waterways from the great lakes to tidewater. Very much less money than an Isthmian canal will cost would furnish a deep waterway from the head of Lake Erie to the Gulf of Mexico by way of Miami and Erie canals and the Ohio and Mississippi rivers, and another great highway for ships from the foot of the lakes to the Hudson river, resulting in far greater advantages to the country than will ever be derived from an Isthmian canal. A tonnage of not more than 3,500,000 annually is looked for from the Isthmian waterway, while the canals referred to at home would soon do thirty times that amount of business. It is a disgrace to this nation—the wealthiest on the globe—that our vast inland water commerce if carried on direct to tidewater must pass through foreign territory. Millions for home development but not a dime of the people's money for unnecessary foreign jobs is the true slogan.

QUAKER.

Shallow-Draught Screw Vessels.

In a paper on "The Screw as a Means of Propulsion for Shallow-Draught Vessels," read at a recent meeting of the Institution of Naval Architects in London, Mr. A. F. Yarrow gives some important information regarding the experience of his firm, Yarrow & Co., in the construction of what are known as tunnel-screw steamers. The introduction to Mr. Yarrow's paper reviews the history of shallow-draught vessels with stern paddle wheels, side wheels, etc., and refers also to some vessels constructed years ago on the tunnel system.

"Coming to the latest development of this type," said Mr. Yarrow, "I would refer to the line drawing which represents a section through one such as we frequently build. The upper part of the tunnel is considerably above the water line, thus enabling the diameter of the propeller to be greater than the draught of water. We adopt, for example, in a boat drawing a foot, propellers of 2½ ft. diameter and in a vessel drawing 2 ft. propellers of 4½ ft. to 5 ft. diameter. When the vessel is at rest the water level inside the tunnel is naturally the same as it is on the outside, but when the propeller begins to revolve the air which is enclosed in the upper part of the tunnel is forced out and replaced by solid water. By this means it will be seen that a large propeller, capable of utilizing considerable power, can be used in combination with a shallow draught. There will be an increased resistance to the forward motion of the vessel, due to the action of the screw in reducing the pressure of water at the inclined part of the tunnel forward of the propeller, and this increased resistance is common, more or less, to all screw ships, but it is probably proportionately greater in this class of vessel than in those where the propeller is in the usual position. There is also a loss of efficiency due to the resistance of the inclined surface of the tunnel aft of the propeller.

"The inclined portion of the tunnel aft of the screw should be as nearly horizontal as possible, so as to diminish this resistance; but this would increase the length of tunnel and involve greater draught, because to augment the capacity of the tunnel below the water line is just so much loss of displacement, and the water in the tunnel above the water line is equivalent to just so much load carried when the boat is at rest and the tunnel full. It is, therefore, desirable to reduce the capacity of the tunnel to a minimum, as considerations of draught render it not always practicable to select a favorable inclination at the after part of the tunnel without causing losses, such as those alluded to above, which may be even greater than if a steeper inclination of tunnel be adopted. The tunnel is sealed on all sides, this being necessary, because when once the air is forced out it must never be allowed to pass in, or the propeller would not be working in solid water. As regards the forward part and the sides, there is no difficulty in sealing the tunnel satisfactorily, but the extreme after part of the tunnel should be arranged to come 2 or 3 in. below the water line; that is sufficiently below the surface to exclude the air. To make the operation clear I would draw your attention to the model, showing the after part of a launch. This, however, does not demonstrate the system favorably because the boat is at rest and the sweeping away of the bubbles of air is not so rapidly effected as when the boat is moving; in fact, in actual full-size examples the action of expelling the air is almost instantaneous. It will be seen that when the motor driving the screw is set in motion the air is driven out of the tunnel, and the propeller then works in solid water.

"Above the screw at the highest part of the tunnel is a door which enables access to be obtained to it with very little difficulty. On one occasion we tested the time taken in changing a propeller on one of our gun boats and it was removed and replaced by another in twenty minutes, when the vessel was afloat. The propeller, when working in a tunnel enveloped all round, is not so liable to damage as if it were at the stern in the usual place. One of the six vessels (Heron type) built by us on this plan for the admiralty a few years since is shown in this paper. They were 100 ft. in length by a beam of 20 ft., and the draught (carrying 25 tons), was 1 ft. 11 in., and the speed, with this load, was 10½ miles an hour. One of two vessels, the Sheikh and Sultan, which we built for the Nile for operating against Omdurman during the last expedition, is also shown in this paper. These vessels were 145 ft. by 24½ ft. It has been stated that these vessels did not tow efficiently, and that the stern-wheelers, which we and other firms built for the previous Nile expedition, towed

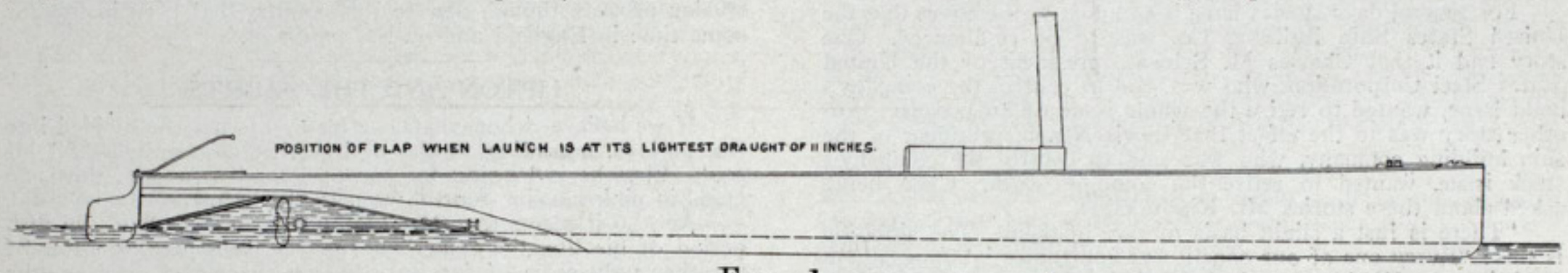


FIG. 1.

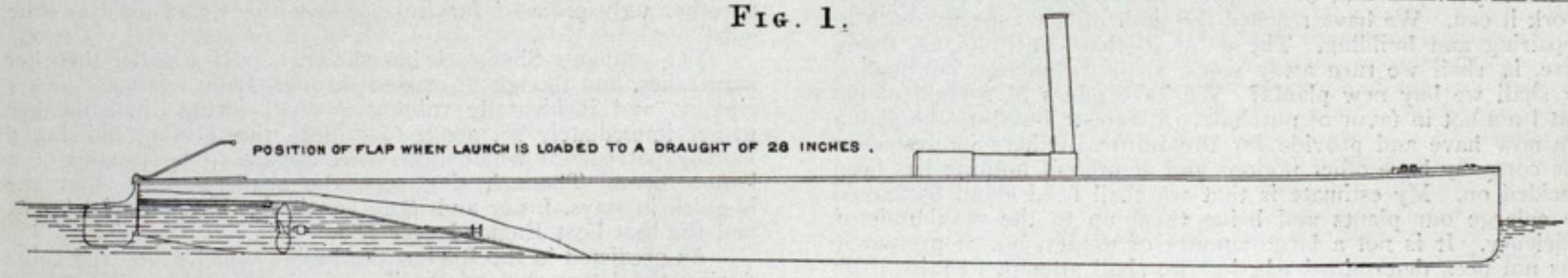


FIG. 2

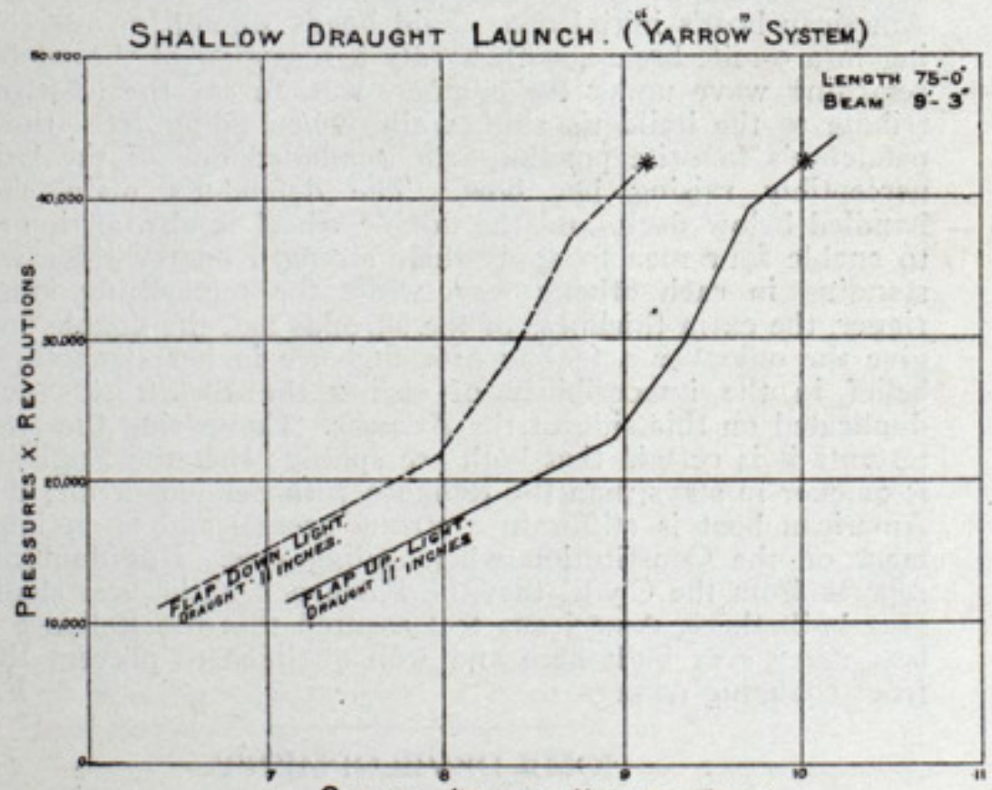


FIG. 3.

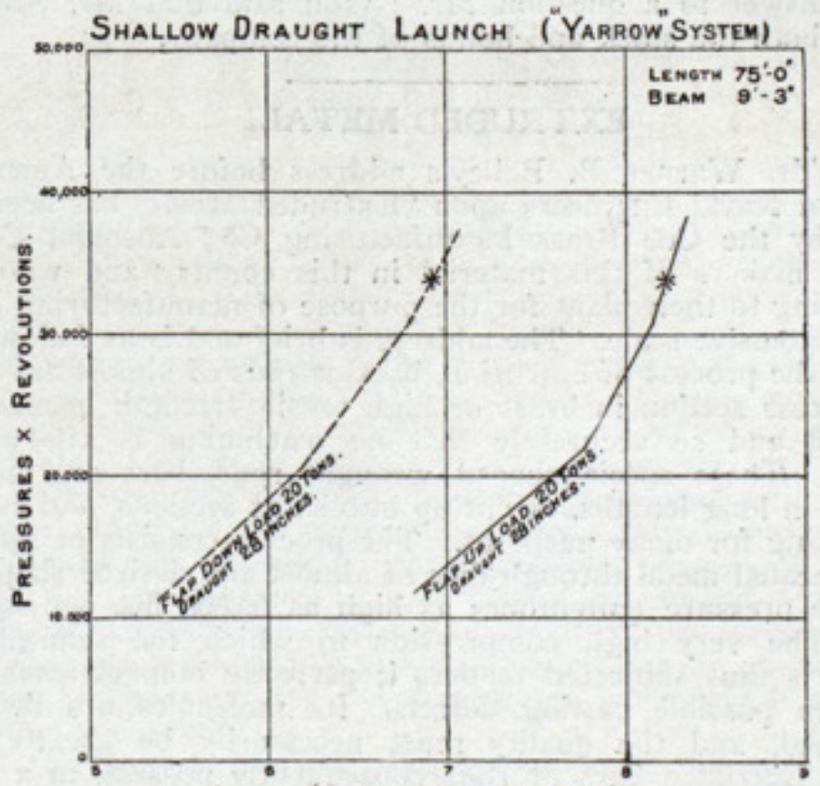


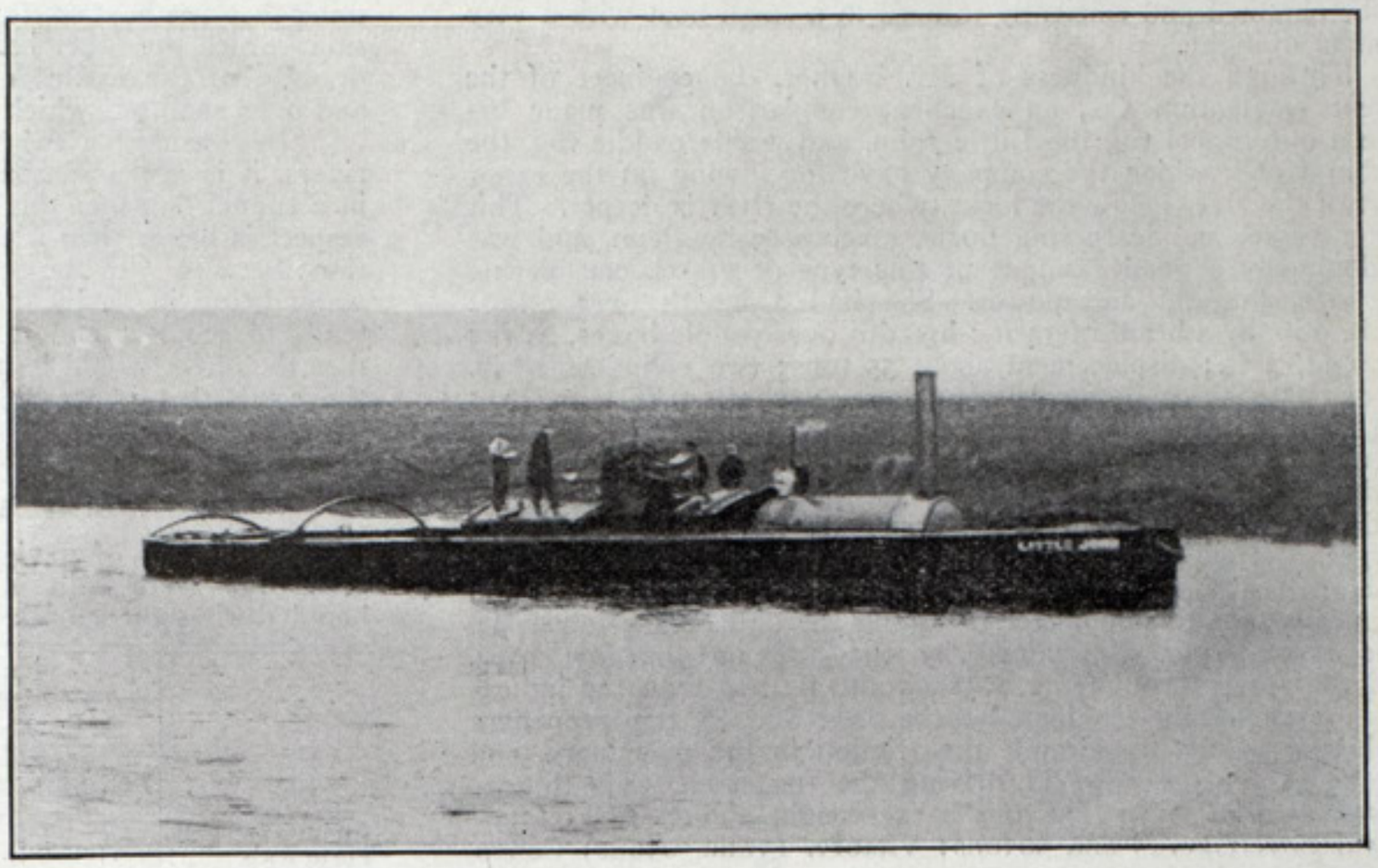
FIG. 4

Section of Tunnel-Screw Steamer built by Yarrow & Co.

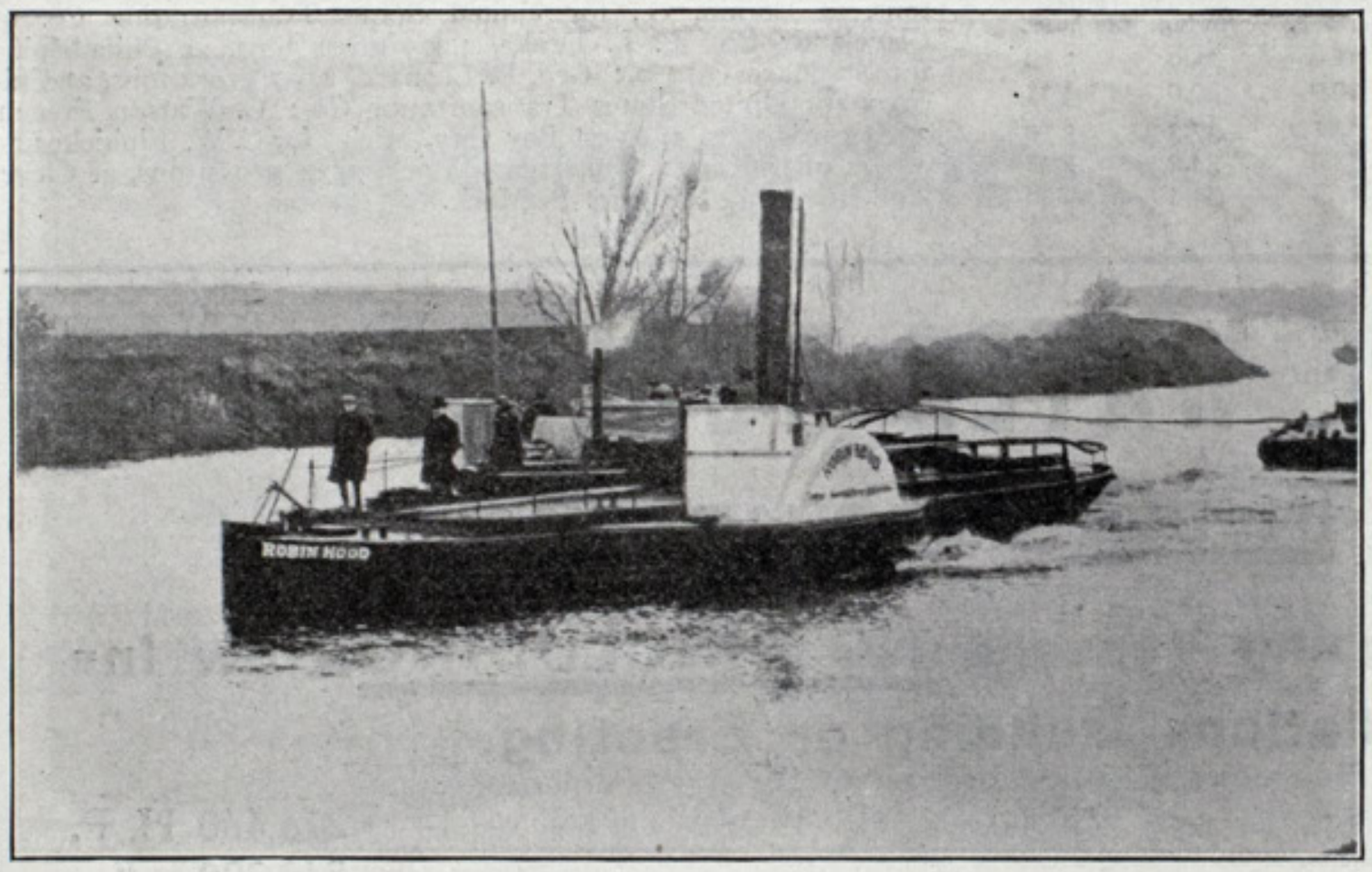
better. That was no doubt perfectly true, and may lead to the impression that vessels built on this plan are not efficient for towing. Such, however, is not the case. As a matter of fact they are very efficient for towing, provided the propellers are made sufficiently large. With a view to securing the maximum efficiency for speed when not towing, the propellers in all these boats were made of small size. Had the Sheikh and Sultan been intended for towing, we should, no doubt, have adopted propellers of a diameter at least 50 per cent. greater than we did. I mention this fact, in passing, to avoid the impression that vessels on this plan do not tow well.

"I now come to a departure which we have recently made in the design of these tunnel vessels, and which has added considerably to their efficiency. It will be remembered that the after part of the upper portion of the tunnel, which is inclined downwards towards the stern, is a source of resistance. As already explained, it is compulsory when starting that the after extremity should be below the water in order to prevent air gaining access to the interior of the tunnel. Now, experience has shown that once the boat is under way the after extremity of this tunnel, when full, may be above the surrounding water, because the rush of water out of the tunnel in a sternward direction is such as to prevent the air passing in; in fact, the after part of this tunnel may be 6 or 8 in. higher than the water level without risk from this cause, at the same time improving the result, due to reduced resistance of the inclined surface. It has been shown that the after part of the tunnel should be below the water line when tne vessel is starting light, but if it were fixed in that position it would be unnecessarily low down when the vessel is loaded, thereby involving greater resistance than if the after part of the tunnel terminated at a level sufficient for the loaded boat.

"In our more recent vessels of this kind, we have made the upper part of the tunnel, from the propeller to the stern, hinged in such a way that it can be raised and lowered to any desired height, either by mechanical means or automatically. Fig. 1 shows the position of the hinged top, or flap, when the boat is light, drawing 11 in., and Fig. 2, when the boat is loaded, drawing 28 in. It will be seen at a glance that when loaded, if the after extremity of the tunnel were in the same position as it is when light, it would involve a greatly increased resistance, while by raising the top of the tunnel the water has a clear passage open to it to freely pass away in an opposite direction to that in which the vessel is traveling. The gain by the raising and lowering of this flap is illustrated by diagrams in Figs. 3 and 4. When the launch is light, drawing 11 in. with the same power, the speed is increased from 9.2 miles an hour with the flap down to 10 miles an hour with the flap up; and when the draught is 28 in., loaded with 20 tons, the speed is increased from 6.9 miles an hour with the flap down to 8.25 miles an hour with the flap up, the power at both speeds being the same. As might naturally be expected, the increase of efficiency due to the lifting of the flap is greater when the boat is loaded, the lower speed in both cases being what they would have been if there had been no adjustable flap, clearly showing the advantage of the flap.

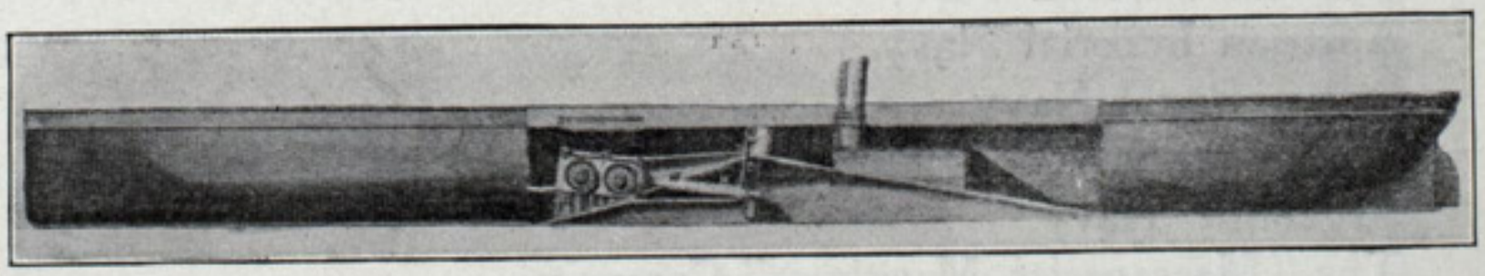


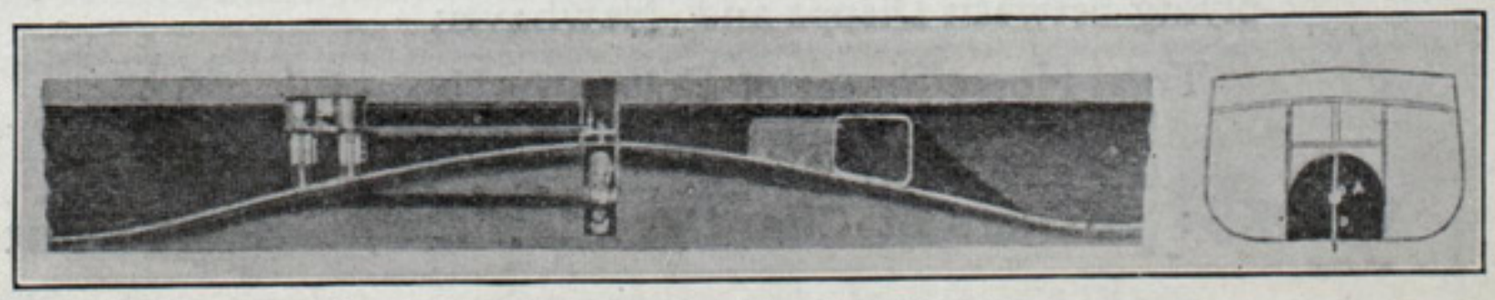
Little John.



Robin Hood.

"We recently conducted experiments with a view to test the towing efficiency of this method of propulsion. We built for the Trent Navigation Co. a twin-screw tug called the Little John. It was 80 ft. in length by 14 ft. 6 in. beam; minimum draught, with steam up, 22 in.; displacement about 40 tons. Each screw was driven by a single inverted engine, 10 in. in diameter by 10 in. stroke; high pressure locomotive boiler. The dimensions of the tug were determined by the size of the locks and the depth of the river. Up to the time of our building this boat the Trent Navigation Co. had experienced much difficulty in dealing with their traffic. Side-wheelers were found too wide to pass through the locks owing to the paddle boxes. A twin-screw boat with propellers in the usual po-





Buchanan's Patent, 1856

sition proved very inefficient; a stern-wheeler was also tried and found unsatisfactory. The company therefore determined to make a trial of the tunnel system, and the Little John was built. She has been in constant work for several months, and has proved conclusively that this system of propulsion is well adapted for towing purposes, enabling a considerable amount of power to be obtained and efficiently utilized in a small boat with a very limited draught.

Through the kindness of Mr. Rayner, the engineer of the Trent Navigation Co., an excellent comparison was made between our tunnel tug the Little John, and a side paddle tug, the Robin Hood, which the company have for towing on the lower part of the river below the locks, where the river is deeper. This latter vessel had feathering floats, machinery by Penn, and was undoubtedly a good example of this type of vessel, considering the size, draught and power. She had a length over all of 91 ft. 6 in. by a beam of 14 ft.; breadth over paddle boxes, 24 ft.; draught, 3 ft.; displacement about 55 tons; two cylinders 18 in. in diameter by 27 in. stroke, condensing; wheels 9 ft. 2 in. over the floats, 3 ft. 10½ in. wide; return-tube marine boiler. It will therefore be seen that the Robin Hood made a fair comparison with the Little John. In order to test the comparative efficiencies under ordinary working conditions, we towed a number of barges, first with one tug and then with the other, over the same reach of the river, indicating the engines at different speeds, and by means of a dynamometer obtaining the pull on the tow rope. The horse-power ascertained by the pull on the tow rope, and the speed through the water would be less than the indicated power of the engines by the loss due to the propellers (whether paddle or screw), the friction in the machinery, and to the power absorbed in driving the tug itself. The barges towed were: Severn, 20 tons barge weight and 57 tons cargo; Royal Sovereign, 15 and 50 tons; Victory, 15 and 50 tons; Congo, 20 tons barge weight, no cargo; crane boat No. 1, 15 and 5 tons; total weight of barges, 85 tons; total weight of cargo, 162 tons; grand total 247 tons. The results are given in the table herewith:

TOWING EXPERIMENTS WITH TUGS ROBIN HOOD AND LITTLE JOHN WITH A VIEW TO TEST THE RELATIVE EFFICIENCIES OF THE TWO SYSTEMS OF PROPULSION.

Name of Tug.	I. H. P. of engines.	Pull on tow rope, pounds.	Horse power at rope.	Percentage of power of machinery utilized in towing.	Speed (miles) per hour.
Robin Hood...	90.2	2,314	31.6	35.0	5.12
	49.98	1,741	20.0	40.0	4.31
Little John.....	118.24	2,901	44.1	37.3	5.70
	94.37	2,321	32.3	34.2	5.22
	61.97	1,823	21.3	34.4	4.38

"From these experiments and other data it was found that the proportion of the power of the engine utilized in towing is very nearly the same in both cases. The paddle boat is superior to the screw at low speeds and the screw better than the paddle at high speeds. On the average there does not appear to be any appreciable difference. It must, however, be borne in mind that one boat conforms to conditions of draught and dimensions which the other boat does not, the over-all dimensions and draught of the Little John enabling her to pass through locks and over shallows which the Robin Hood could not.

"In considering the question of towing on canals or shallow rivers, it is not unreasonable to assume that the screw working in a tunnel damages the banks to a minimum extent, and in this respect is better than a paddle or even a screw in its usual location; because with the propeller working in a tunnel, the rush of water being in an inclined direction towards the bottom, rather tends to scour it and to keep open the course, while with paddles the effect would be rather to disturb the banks and to cause the earth that is washed away from the sides to settle in the middle."

SHIP BUILDING IN APRIL.

The bureau of navigation reports that 135 vessels of 44,619 gross tons were built in the United States and officially numbered during the month of April, 1903, as follows:

	WOOD.				STEEL.				TOTAL.	
	SAIL.		STEAM.		SAIL.		STEAM.			
	No.	Gross tons.	No.	Gross tons.	No.	Gross tons.	No.	Gross tons.	No.	Gross tons.
Atlantic and gulf.	48	5,132	28	986	1	175	6	13,540	83	19,833
Porto Rico	1	7	....	.....	....	.....	....	.....	1	7
Pacific	2	44	21	2,125	....	.....	1	1,295	24	3,464
Hawaii.....	....	.....	....	.....	....	.....	....	.....	....	.....
Great Lakes.....	2	27	9	253	....	.....	7	20,838	18	21,118
Western rivers...	....	.....	9	197	....	.....	....	.....	9	197
Total..... ..	53	5,210	67	3,561	1	175	14	35,673	135	44,619

The largest steel steam vessels included in the list are the Maine of 7,914 gross tons building at Sparrow's Point, Md., for the Atlantic Transport Co.; Hurlbut W. Smith, 4,662 gross tons, at Lorain, O., for United States Transportation Co. of Cleveland; Col. E. L. Drake, 4,205 gross tons, at Philadelphia for Standard Oil Co.; Geo. B. Leonard, 4,037 gross tons, at Chicago, for United States Transportation Co.; G. Watson French, 3,883 gross tons, at West Bay City, Mich., for C. W. Elphicke and others of Chicago; Wm. Henry Mack, 3,781 gross tons, at Cleveland, for estate of Wm. S. Mack.

BELLEVILLE WATER-TUBE BOILERS

NOW IN USE (FEBRUARY, 1903)

On Board Sea-going Vessels, NOT INCLUDING New Installations Building or Erecting.

French Navy	276,460 H. P.
English Royal Navy	849,300 "
Russian Imperial Navy	193,900 "
Japanese Imperial Navy	122,700 "
Austrian Imperial Navy	32,900 "
Italian Royal Navy	13,500 "
Chilian Navy	26,500 "
Argentine Navy	13,000 "
The "Messageries Maritimes" Company	87,600 "
Chemins de fer de l'Ouest: (The French Western Railway Co.) Steamships plying between Dieppe and Newhaven	18,500 "
Total Horse Power of Boilers in Use	1,634,360

WORKS: Ateliers et Chantiers de l'Ermitage, at Saint-Denis (Seine), France.

TELEGRAPHIC ADDRESS: Belleville, Saint-Denis-Sur-Seine.

ITEMS OF GENERAL INTEREST.

Mr. Charles M. Schwab was, at a meeting of the directors of the United States Steel Corporation held in New York on Tuesday, re-elected president. There have been innumerable reports that Mr. Schwab would retire at the end of the year but all these appear to have been groundless. It is related that the long European vacation restored him to his accustomed vigor and that he is attacking the problems of his office with all his old-time energy. Mr. John F. Dryden was elected a director in place of the late Abram S. Hewitt.

A little while ago it was announced that the Cunard Steamship Co. was to try the experiment of abolishing first-class accommodations on some of the steamers. A new liner, the Carpathia, is just about to leave on her maiden voyage to Boston in this service. It is the intention later to put her in the New York service. She is 560 ft. long, has a gross tonnage of 13,555, a displacement of 24,000 tons and horse power of 9,000, calculated to produce a speed of 14½ knots an hour. She will have accommodations for 1,700 passengers.

Mr. Charles V. Minott, a well known ship builder at Phippsburg Center, Me., died this week. He had been continuously in the ship building business since 1853. His best known vessel was the wooden ship Aryan. The Aryan has the distinction of being the last wooden ship built in the United States. In the natural order of things she will be the last survivor of the clipper ships, once so numerous on the seas but now supplanted by the more economical fore-and-after. The Aryan is 248 ft. 6 in. long, 42 ft. 2 in. beam and 26 ft. 3 in. deep. She is at present in San Francisco, having made the journey from Baltimore in 136 days.

Rear Admiral Bowles, chief naval constructor, has made a report to the navy department in which he has advocated the enforcement of penalties for overweight in machinery. Heretofore the penalties have been waived. The matter is serious because every ton in excess of the designed displacement of the ship means an increase in draught and a consequent reduction in the speed of the ship. In the case of the battleship Maine Rear Admiral Bowles has reported that she is 330 tons overweight. The injuries sustained by the supports of the turret and broadside battery guns of the Maine were due to the failure of the construction bureau to be advised of the increase in the power of the guns.

Chinese firemen seem to be immune to the fierce heat of the fire room on ocean steamers and can stand up to temperatures that would speedily prostrate white men. On ocean steamers most firemen lay off every third trip to recuperate and have to get the very best food and large quantities of it, but a Chinaman will eat a quart or two of rice and hold his position in front of a forced draft that will sweep the coal off the shovel as soon as it is presented at the open door. The qualifications of the Asiatic fireman has been noted down by observers who see in it an opportunity to cripple the trade of their opponents by dissauding, through force, if required, Chinese firemen from shipping on English vessels, and an English paper has stated, upon competent evidence, that without Chinese firemen the insurance rates would be so high that the vessels could not be run economically. There are over sixty lines of steamers trading with the far east. Out of this large number only three of them have European firemen and these have to have coolies to assist them.

TRADE NOTES.

A sumptuous catalogue has been issued by the Sherwood Manufacturing Co., Buffalo, N. Y., on the subject of their engine and boiler supplies. The catalogue is well illustrated and carefully indexed and is devoted to injectors, ejectors, oil cups, multiple oilers, oiling devices, lubricators, boiler oil injector, oil pumps, grease cups, flue scrapers and blowers, gauge cocks, water guages, pop valves and hose connections. Anyone interested may obtain a copy of the catalogue upon request.

Two catalogues have lately come from the Niles-Bement-Pond Co. of New York which reach the high-water mark of printing excellence. Both are individual and distinct. One is devoted to horizontal boring, drilling and milling machines; the other to multiple drilling machines. The catalogues are largely made up of very beautiful half-tones, and the letterpress matter, printed in brown, is of the simplest character and intended to describe the merits of the machines as clearly as possible. The paper is of the heaviest and best quality, and the catalogues represent the expenditure of a small fortune.

Photographers Attention!

THE MARINE REVIEW is desirous of obtaining at all times interesting photographs of a maritime character. Should an accident occur, should a ship be stranded, should an unusual repair job show up in a ship yard, the MARINE REVIEW will pay substantial sums of money for any such photographs. Many a man in a dry dock, in a ship yard or aboard ship has a camera. Possibly the master or the superintendent has one. If he can accompany the photograph with a written description (merely facts; we'll furnish sentences, spelling and punctuation), so much the better and so much the more profit for him. The REVIEW pays well for good news articles.

Undoubtedly hundreds of extraordinary repair jobs are going on which would interest naval architects and marine engineers, but which are never published because they are known only to those who are working upon them.

This invitation is open to everyone.

United Marine Mfg. & Supply Co.,

MANUFACTURERS OF AND DEALERS IN

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FOR SHIPS AND FORTIFICATIONS.

ALBERT C. JAHL, General Manager,
100 William St., New York, U. S. A.

ENGLISH VIEW OF TRADE CONDITIONS.

Concerning the present drift of trade in the United States and in Great Britain the Iron & Coal Trades Review of London, a most competent observer, says:

"The present is a more or less critical juncture in the trade conditions of both the United States and our own country. Two or three years ago the appearances of a permanent American invasion of our markets were most pronounced. We were told that American hematite pig iron could be made at Pittsburg for about 20 shillings per ton less than its minimum cost at Middlesbrough on the Tees. The exports of American iron and steel rose so rapidly that almost while you looked, to quote the elder Weller, they appeared to be 'swellin' wisibly.' Within three years afterwards, the United States—so deceptive are all appearances that relate to that country—practically ceased to care for the export trade, and reduced its exports in certain lines to a fraction of what they had been, while its imports of iron and steel from this country and Germany amounted to well over 1,000,000 tons in twelve months. Had these events happened in 1901, it is possible that the American commission of the British Iron Trade Association would not have been organized, because we should have been likely enough to delude ourselves with the belief that this was to be the true ultimate basis of the trade between the two countries. Looking back on the immediate past, however, no one can doubt that the association did a wise and a useful thing in the appointment of that commission, whatever the future may have in store. The future has probably been profoundly affected by the constitution of the United States Steel Corporation, the obvious policy of which must be to keep up prices as far as possible to their present level, and to take care that the great store of minerals, for which they have paid so vast a price, is not disposed of for a mess of pottage.

"Both on this side and on the other side of the Atlantic, the future is likely to be most vitally influenced by the conditions and attitude of labor. It has been usual to assume that in this country we had more than our fair share of worry and trouble from this source. But we have had our experience and profited by it. In the iron trade, at any rate, the labor conditions for many years past have been as free from friction and contest as could be expected of any such conditions. In the United States, much of the experience that is to shape the destinies of the future has yet to be acquired. Many men of light and leading, both here and there, are of opinion that the future of American labor is not likely to be either smooth or progressive. There have certainly been ominous warnings within recent years—and even at present they are not wanting—that in the iron and steel industries those who have prophesied smooth things are likely to be mistaken. There may be a period of minimum wages and minimum labor difficulty in the iron trade, just as there has been a period of minimum prices, and minimum transportation costs. It is conceivable that they all may now be things of the past. If so, it is also conceivable that forces and influences which were equally beyond our control and theirs may do more to protect our markets from invasion than any modified system of protection could have done."

The navy department has under consideration plans for the construction of several fast scouts, and preparatory to asking congress for the necessary authority for their construction, information is being collected to determine the best type for the purpose. Admiral Dewey, and the board over which he presides, are anxious to provide the navy with such vessels, the idea being to attach them to the battle squadrons. They would scout in advance of the squadrons. The armament of these vessels will of necessity be barely sufficient to keep off torpedo boats and other light craft.

A small steamboat building at Ashtabula for Major Kingman, United States engineer at Cleveland, and which is to be used as an inspection boat, was launched a few days ago.

Steam Barge for Sale.

For Sale.—Steam barge, 131 ft. keel, 25 ft. beam, 9 ft. deep. Capacity, lumber, 260 M. ft.; coal, 375 tons. Good power; can handle two or three barges. Everything pertaining to this boat is in good condition. Terms cash. Address Lock Box 35, St. Clair, Mich. May 28.

Taylor Boiler for Sale.

For Sale.—A Taylor safety water-tube boiler 7½ x 7½ x 7½ ft.; 225 H. P. Slightly used, in perfect condition. As it is too large for our use, no reasonable offer will be refused. See cut on page 15, this issue. Address Western Boat Works, 1022 River street, Detroit, Mich. May 7.

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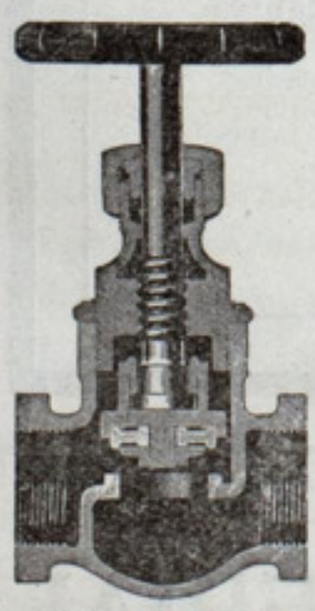

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OPERATIONS OF BIG ELECTRICAL CONCERNS.

A director is authority for the statement that the sales of the Westinghouse Electric & Mfg. Co. and its American auxiliary companies for the year ended March 31 aggregated $24,000,000, and that the British Westinghouse Electric & Mfg. Co. has received orders since Aug. 1, the beginning of its fiscal year, aggregating nearly $7,000,000 and has now employed in the production of the apparatus for the execution of these contracts in its extensive works at Manchester over 3,500 workmen. In regard to the statement that the Westinghouse company did not join the General Electric Co. in the purchase of the Curtis turbine patents, and that, therefore, the latter company has the exclusive right to manufacture such engines, it is said that the Curtis turbine must still be regarded as in an experimental stage, because none is yet in daily use outside of the works at Schenectady, and that therefore it will take a further long period and many changes to bring the apparatus into a practical condition.

The Westinghouse company, however, has manufactured a large number of generators for the Parsons turbines made by the Westinghouse Machine Co., which latter company, prior to the General Electric Co. taking up the Curtis turbine patents, had acquired the exclusive right to manufacture the Parsons turbines. This company has since, while engaged in the manufacture of the Parsons turbines, made radical improvements in the direction of reducing the size and weight of the machine without impairing its efficiency, which, it is claimed, has proved to be higher than that of any other form of steam engine on the market. The great value of the turbine engine for the operation of electric generators is recognized, and both the General Electric and Westinghouse Machine companies will undoubtedly compete vigorously for this kind of engine business.

The Westinghouse Machine Co. and its engineering branch, Westinghouse, Church, Kerr & Co., are organizations that were in existence at the time of the arrangement between the General Electric and Westinghouse companies in regard to patents. The Westinghouse Machine Co. and Westinghouse, Church, Kerr & Co., are engaged in the manufacture of steam and gas engines and in general engineering work, and Westinghouse, Church, Kerr & Co. have been appointed engineering contractors by the Pennsylvania railroad for the execution of its new tunnel, machinery and electrical work, from New Jersey to Long Island, and are at present carrying out many other important engineering undertakings. While in this country the Westinghouse Electric and Westinghouse Machine companies are entirely independent, in England the British Westinghouse Co. is operating under contract relations with both companies.

The Westinghouse Electric & Manufacturing Co. has, at the present time, nearly 10,000 employes at East Pittsburg, and its various other works, and is bringing to completion an extensive addition to its East Pittsburg works, aggregating 60 per cent. of the completed portion of these works. This new addition will be about 1,800 ft. in length by 230 ft. in width, consisting of one main high bay the full length of the new building and two two-story bays on each side of equal length. The additional manufacturing facilities which will be available on completion of these new additions are needed on account of the rapid development of the company's business, for the purpose of executing large orders now on the books, and particularly for large generators and rotary transformer apparatus, of which class of machinery the Westinghouse company has supplied about 60 per cent. of all that has been used in America.

The issued capital stock of the General Electric Co. is at present about $45,000,000. The business reported for its last fiscal year was nearly $40,000,000. The Westinghouse company's issued capital is about $18,000,000, with sales, as stated above, of $24,000,000; that is, the sales have exceeded the issued capital by one-third. The shares of the General Electric Co. have recently commanded a premium of 90 to 95 per cent., while the Westinghouse shares have for some months commanded a premium of over 100 per cent.

The C. W. Hunt Co., Staten Island, New York, are makers of a complete line of coal handling machinery. The company's latest bulletin is quite a clever idea. It gives illustrations of a parabolic boom and automatic railway, cable railway, standard push car, tip car, Hunt steam shovel, spring barrow, electric coal hoist and mast, and gaff fittings, saying that if any one is interested in any of the parts illustrated the company will be pleased to send a complete catalogue upon request.

That the maneuvering power of ships starting from a position of rest may be increased the board of construction of the navy department has decided to recommend a change from inboard turning to outboard turning screws on all ships where the cost will not be large.

REDUCED FARES VIA PENNSYLVANIA LINES.

Excursion tickets will be sold via Pennsylvania Lines as follows:

To St. Louis, Mo., June 6 and 17 account thirty-first saengerfest of North American Saengerbund.

To Boston, Mass., July 2 to 5, inclusive, account National Educational Association.

For particulars consult ticket agent of Pennsylvania Lines.

Sunday outing excursions on the Nickel Plate road begin April 19, 1903, to continue every Sunday until further notice. Fare $1 each person, in parties of five or more traveling together and returning same day. Tickets good between any two stations within a distance of 100 miles. For particulars apply to nearest ticket agent. E. A. Akers, C. P. & T. A., Cleveland, O. May 7.

Schooner for Sale.

Schooner carrying 150 M. ft. of lumber or 90 cords of maple wood. Will be sold cheap for cash. For full particulars, address Box 37, Marine Review Pub. Co., Cleveland, O. tf

Engine For Sale.

High pressure compound condensing engine. Cylinders 19 and 32 in. diameter by 26-in stroke. Nominal H. P., 46; effective H. P., 329. Designed by Harry W. Granger, Detroit. Built by Canadian Locomotive & Engine Co., Kingston, Ont. This engine has been thoroughly overhauled and is now complete and in first class condition. Apply to The Montreal Transportation Co., Kingston, Ont., or Montreal, P. Q. May 21.

Side-Wheel Passenger Steamer.

For Sale—Passenger and freight steamer Urania. British registry. Built at Milwaukee in 1875 and then named Flora. Rebuilt in 1899 with engines from revenue cutter Andrew Johnson. Wooden hull. Three decks. Length 180 ft.; breadth 27 ft. 4 in. Thirty-three staterooms, 98 berths. Allowed 98 first-cabin and 402 steerage passengers. Speed 13 miles. Electric light plant practically new. Engines and boilers were thoroughly overhauled when transferred to this hull and have been well kept up. Urania has been running between Cleveland and Port Stanley and fuel consumption for day and night trips on run was about 400 tons per month. Address Box 41, the Marine Review Pub. Co., Wade Bldg., Cleveland. tf.

Scotch Marine Boiler for Sale.

Scotch Marine Boiler for sale. Size, 10 ft. by 78 in.; triple riveted; 5/8 steel plate; dome 56 in. by 24 in.; two 4-in. and one 6-in. inlet in the dome; ninety-eight 3-in. tubes; stays 5/8 center; allowed 169 lbs. steam pressure to the square inch. Boiler as good as new. Located at Detroit, Mich. For price address Isaac Applebaum, 38-40 Randolph street, Detroit, Mich. t.f.

Steamer Imperial for Sale.

Has been running with freight and day passengers (licensed to carry 220) between Windsor, Amherstburg and Pelee Island No cabin accommodations for passengers Screw steamer built at Toronto in 1866; rebuilt in 1897. Wooden hull of 109 ft. length and 22 ft. width. Steeple compound engines of 12 and 16 in. Engines were compounded only six years ago and have been well kept up. Boiler of ample size and in good condition. Address Box 42, the Marine Review Pub. Co., Wade Bldg., Cleveland, O. tf

Steam Barge for Sale.

Steam barge William Rudolph. Capacity 250 M. ft. of lumber. Rates A 2½. Compound condensing engine put in this year. Boat in good condition. For particulars address A. F. Temple, Muskegon, Mich. May 28.

Steamer and Tow Barge for Sale.

For Sale—Canadian steamer Orion, class A-2. Capacity 30,000 bushels of wheat or 500 M ft. of lumber or 900 tons coal.

Canadian tow barge Muskoka, A-2. Capacity 30,000 bushels wheat, or 600 M ft. of lumber, or 900 tons coal.

For particulars apply to Collins Bay Rafting & Forwarding Co., Ltd., Kingston, Ont. June 18.

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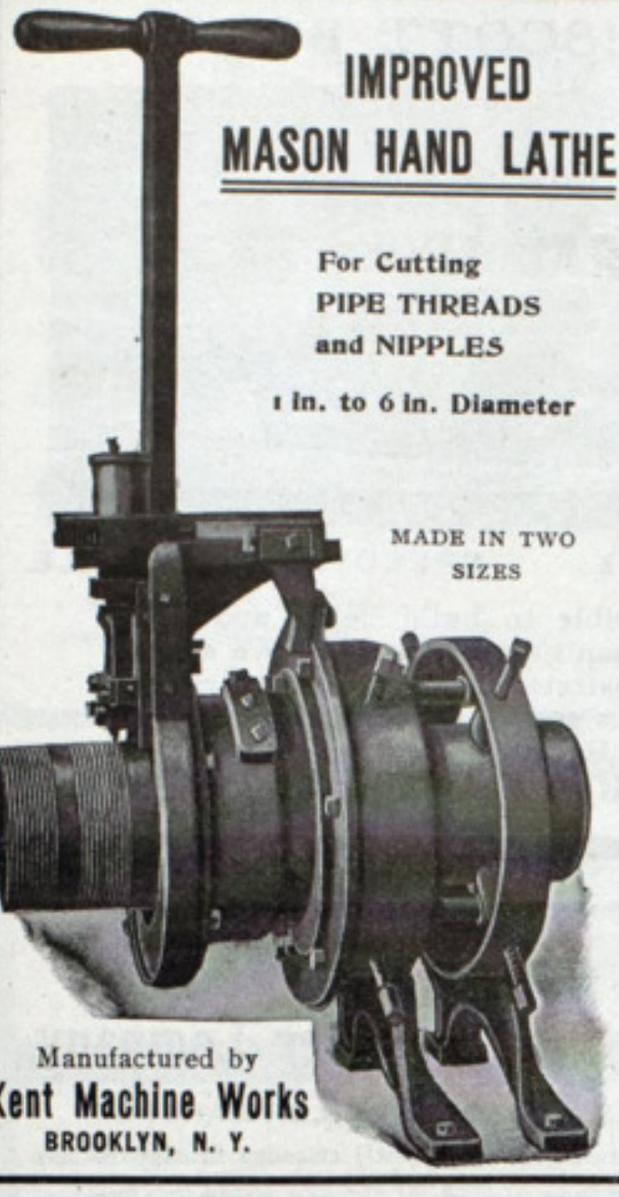

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U. S. Engineer Office, Duluth, Minn., April 29, 1903. Sealed proposals for furnishing 43,000 cu. yds. broken stone, or 43,000 cu. yds. pebbles for concrete south pier at Superior Entry, Wis., will be received here until noon May 29, 1903, and then publicly opened. Information on application. D. D. GAILLARD, Capt., Engrs. May 21.

U. S. Engineer Office, Grand Rapids, Mich., May 6, 1903. Sealed proposals for constructing steel hull and cabin for suction dredge will be received here until 3 p. m. June 5, 1903, and then publicly opened. Information furnished on application. M. B. ADAMS, Lieut. Col., Engrs. May 28.

U. S. Engineer Office, Milwaukee, Wis., May 4, 1903. Sealed proposals for building pile revetment at Two Rivers Harbor., Wis., will be received here until 3 o'clock, p. m , June 3, 1903, and then publicly opened. Information furnished on application. J. G. WARREN. Major, Engrs. May 28.

Sealed proposals will be received at the office of the Engineer of the Tenth Light House District, Buffalo, N. Y., until 12 o'clock M., of Saturday, May 30, 1903, and then opened, for building a keeper's dwelling at the Grassy Island Range Light Station (Ecorse), Detroit river, Mich., in accordance with specifications and plans, copies of which, with blank proposals and other information, may be had upon application to the Engineer, Tenth Light House District, Buffalo, N. Y. May 21.

Treasury Department, Office of General Superintendent U. S. Life Saving Service, Washington, D. C., April 29, 1903. Sealed proposals will be received at this office until 2 o'clock p. m. of Monday the 25th day of May, 1903, and then publicly opened, for furnishing supplies required for use of the life saving service for the fiscal year ending June 30, 1904; the supplies to be delivered at such points in New York City, Grand Haven, Mich., and San Francisco, Cal., as may be required, and in the quantities named in the specifications. The supplies needed consist of beds and bedding, blocks and sheaves, cordage, crockery, furniture, hardware, lamps, lanterns, etc.; medicine, etc.; paints, oils, etc.; ship chandlery stoves, etc.; tools and miscellaneous articles, all of which are enumerated in the specifications attached to the form of bid, etc., which may be obtained upon application to this office, or to the Inspector of Life Saving Stations, 17 State street, New York City; Superintendent Twelfth Life Saving District, Grand Haven, Mich.; and Superintendent Thirteenth Life Saving District, New Appraisers' Stores, San Francisco, Cal. Envelopes containing proposals should be addressed to the "General Superintendent U. S. Life Saving Service, Washington, D. C.," and marked on the outside, "Proposal for Annual Supplies." The right is reserved to reject any or all bids, and to waive defects, if deemed for the interests of the government. S. I. KIMBALL, General Superintendent. May 14.

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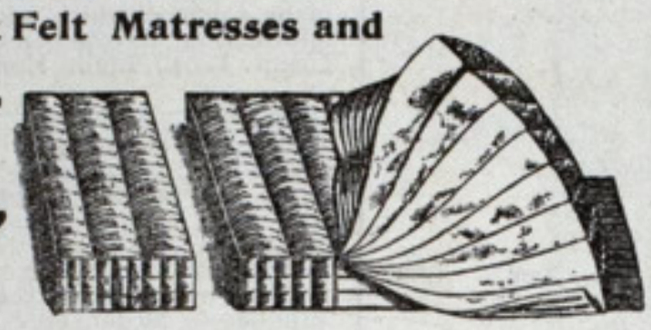

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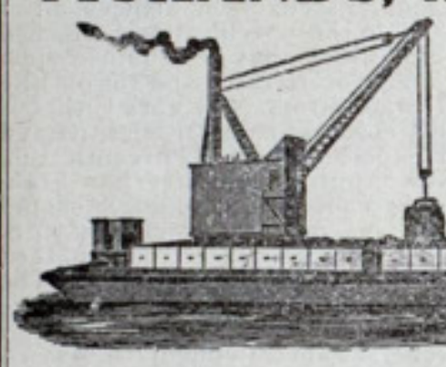

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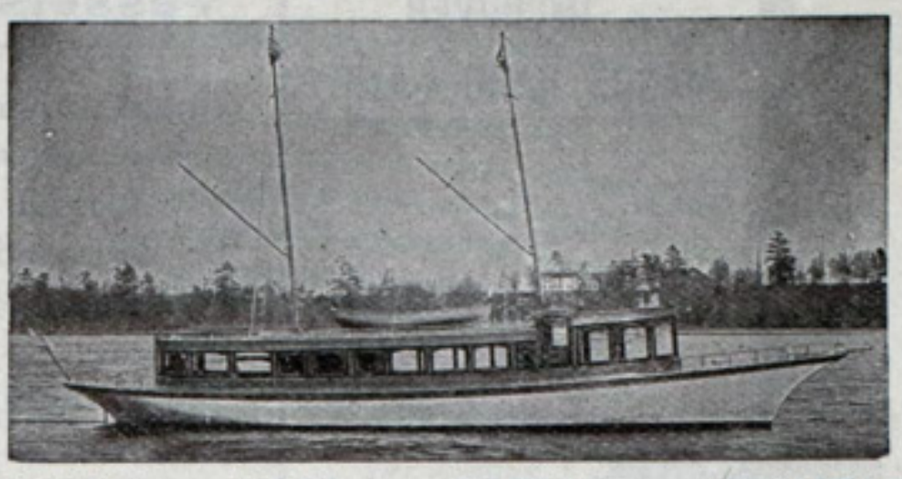

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Macbeth Iron Co.....Cleveland.

FLUE WELDING.

Fix's, S. Sons .....Cleveland.

FURNACES FOR BOILERS.

Continental Iron Works.....New York.

FUELING COMPANIES AND COAL DEALERS.

Castner, Curran & Bullitt (Pocahontas) ....Phila.
Graham Coal & Coke co., Ldt.....Detroit.
Hanna, M. A. & Co. .....Cleveland.
Pickands, Mather & Co. .....Cleveland.
Pittsburg Coal Co. .....Cleveland.
Rochester & Pittsburg Coal & Iron Co. ....Buffalo.
Smith, Stanley B. & Co. .....Detroit.
Youghiogheny & Lehigh Valley Coal Co...Chicago.

GASKETS, RUBBER.

New York Belting & Packing Co.....New York.

GAS BUOYS.

Safety Car Heating & Lighting Co. ..New York.

GAS AND GASOLINE ENGINES.

Chase Machine Co. .....Cleveland.

GAGES, STEAM AND VACUUM.

American Steam Gauge Co. .....Boston.
Ashton Valve Co. .....Boston.

GRAPHITE.

Dixon Crucible Co., Joseph .....Jersey City, N. J.

HAMMERS, STEAM.

Chase Machine Co. .....Cleveland.

HARDWARE, SHIP.

Topky Brothers .....Ashtabula, O.

HATCH GEARS.

"Long-Arm" System Co. .....Cleveland.

HEATING APPARATUS.

Buffalo Forge Co. .....Buffalo.
Sturtevant, B. F. Co. .....Boston.

HOISTS FOR CARGO, ETC.

American Ship Building Co.....Cleveland.
Brown Hoisting Machinery Co., Inc. ....Cleveland.
Chase Machine Co. .....Cleveland.
Elwell-Parker Electric Co. .....Cleveland.
General Electric Co. .....New York.
Hyde Windlass Co. .....Bath, Me.
Lidgerwood Mfg. Co.....New York.
Marine Iron Co. .....Bay City.
Westinghouse Electric & Mfg. Co....Pittsburg, Pa.

HOLLOW STAYBOLT IRON.

Falls Hollow Staybolt Co.....Cuyahoga Falls, O.

HOSE FITTINGS.

Farnan Brass Works. .....Cleveland.

HOSE, RUBBER.

New York Belting & Packing Co.....New York.

HYDRAULIC MACHINERY.

Watson-Stillman Co., The.....New York.
Wood & Co., R. D. .....Philadelphia.

ICE MACHINERY.

American Linde Refrigerating Co. .....New York.
Roelker, H. B. .....New York.

INDICATORS FOR STEAM ENGINES.

American Steam Gauge Co. .....Boston.
Ashton Valve Co. .....Boston.

INJECTORS.

American Injector Co.....Detroit.
Crane Co. .....Chicago.
Jenkins Bros. .....New York.
Lunkenheimer Co. .....Cincinnati.
Penberthy Injector Co. .....Detroit, Mich.

INSURANCE, MARINE.

Brown & Co. .....Buffalo.
Brown, W. W. .....Cleveland.
Dunham, R. J. .....Chicago.
Elphicke, C. W. & Co. .....Chicago.
Fleming & Co., P. H. .....Chicago
Hawgood & Co., W. A. .....Cleveland.
Helm & Co., D. T. .....Duluth.
Hutchinson & Co. .....Cleveland.
Insurance Co. of North America....Philadelphia
McCarthy, T. R. .....Montreal.
McCurdy, Geo. L. .....Chicago.
Mitchell & Co. .....Cleveland.
Peck, Chas. E. & W. F. ...New York and Chicago.
Richardson, W. C. .....Cleveland.
Sullivan, D. & Co. .....Chicago.
Weeks, F. H. .....New York.

IRON ORE AND PIG IRON.

Bourne-Fuller Co. .....Cleveland.
Hanna, M. A. & Co. .....Cleveland.
Pickands, Mather & Co. .....Cleveland.

LATHE, FOR CUTTING PIPE THREADS.

Kent Machine Works .....Brooklyn, N. Y.

LAUNCHES—STEAM, NAPHTHA, ELECTRIC.

Marine Construction & D. D. Co.....
.....Mariner's Harbor, S. I., N. Y.
Truscott Boat Mfg. Co.....St. Joseph, Mich.
Warrington Iron Works .....Chicago.
Willard, Chas. P. .....Chicago.

LIFE FLOATS.

Carley Life Float Co. .....New York.

LIFE PRESERVERS, LIFE BOATS, BUOYS.

Armstrong Cork Co. .....Pittsburg.
Drein, Thos. & Son .....Wilmington, Del.
Kahnweiler's Sons, D. .....New York.
Lane & DeGroot .....Long Island City, N. Y.
Marine Construction & Dry Dock Co.....
.....Mariner's Harbor, S. I., N. Y.

LIGHTS, SIDE AND SIGNAL.

Helvig, H. A. J.....New York.
Russell & Watson .....Buffalo.

LOGS.

Walker & Sons, Thomas .....Birmingham, Eng.
Nicholson Ship Log Co. .....Cleveland.
Also Ship Chandlers.

LUMBER.

Martin-Barriss Co. .....Cleveland.
Moran Bros. Co. .....Seattle, Wash.

MACHINISTS.

Chase Machine Co.....Cleveland.
Macbeth Iron Co. .....Cleveland.
Union Machine & Boiler Co.....Cleveland.
Ward Machine Co.....Cleveland.

MACHINE TOOLS (WOOD WORKING).

Atlantic Works, Inc. .....Philadelphia.

MACHINERY, NEW AND SECOND HAND.

Bowler & Co. Geo. H. .....Cleveland.
Clyde Machine Works.....Chicago.

MAN-HOLES, SWING DOORS, ETC.

"Long-Arm" System Co. .....Cleveland.

MARINE RAILWAYS, BUILDERS OF

Crandall & Son, H. I. .....East Boston, Mass.

MATTRESSES, CUSHIONS, BEDDING.

Fogg, M. W.....New York.

MECHANICAL DRAFT FOR BOILERS.

American Ship Building Co. .....Cleveland
Bloomsburg & Co., H. .....Baltimore, Md.
Buffalo Forge Co. .....Buffalo.
Detroit Ship Building Co. .....Detroit.
Sturtevant, B. F. Co. .....Boston.

METALLIC PACKING.

American Metallic Packing Co. .....Cleveland.
Hayden Mfg. Co., N. L.....Columbus, O.
Katzenstein, L. & Co. .....New York.
U. S. Metallic Packing Co. .....Philadelphia.

METAL POLISH.

Bertram's Oil Polish Co. .....Boston.

MOTORS, GENERATORS—ELECTRIC.

Buffalo Forge Co. .....Buffalo.
Electro-Dynamic Co. .....Philadelphia.
Elwell-Parker Electric Co. .....Cleveland.
General Electric Co. .....Schenectady, N. Y.
"Long-Arm" System Co. .....Cleveland.
Sturtevant, B. F. Co. .....Boston.
United Marine Mfg. & Supply Co.....New York.
Westinghouse Electric & Mfg. Co....Pittsburg, Pa.

NAUTICAL INSTRUMENTS.

Bliss, John & Co. .....New York.
Ritchie, E. S. & Sons .....Brookline, Mass.

NAVAL ARCHITECTS.

Gaskin, Edward .....Buffalo.
Kidd, Joseph .....Duluth, Minn.
Logan, Robert .....Cleveland.
Mosher, Chas. D. .....New York.
Newman, R. L. .....New York.
Sadler, Perkins & Field.....New York
Wood, W. J. .....Chicago.

OAKUM.

DeGrauw, Aymar & Co. .....New York.
Stratford Oakum Co.,.....Jersey City, N. J.

OILS AND LUBRICANTS.

Dixon Crucible Co., Joseph .....Jersey City, N. J.
Standard Oil Co. .....Cleveland.

PACKING.

American Metallic Packing Co. .....Cleveland.
Crane Co. .....Chicago.
Hayden Mfg. Co., N. L.....Columbus, O.
Jenkins Bros. .....New York.
Katzenstein, L. & Co. .....New York.
New York Belting & Packing Co.....New York.
United States Metallic Packing Co. ....Philadelphia.

PAINTS.

Baker, Howard H. & Co. .....Buffalo.
Berry Bros., Ltd. .....Detroit.
Mohawk Paint & Chemical Co.....New York.
New Jersey Zinc Co. .....New York.
Topky Brothers .....Ashtabula, O.
Upson-Walton Co. .....Cleveland.

PATENT ATTORNEYS.

Thurston & Bates .....Cleveland.

PATTERN SHOP MACHINERY.

Atlantic Works, Inc. .....Philadelphia.

PIPE—BRASS AND COPPER, IRON PIPE SIZE.

Waterbury Brass Co.....New York.

PIPE, WROUGHT IRON.

Bourne-Fuller Co .....Cleveland.
Crane Co .....Chicago.
Macbeth Iron Co.....Cleveland.

PLANING MILL MACHINERY.

Atlantic Works, Inc. .....Philadelphia.

PLATE BENDING AND PLANING MACHINES.

Wood & Co., R. D. .....Philadelphia.

PLUMBING, MARINE.

Mott, J. L., Iron Works .....New York.
Reilly Repair & Supply Co., James....New York.
Sands, Alfred B. & Son .....New York.

PNEUMATIC TOOLS.

Allen, John F., ... New York.
Chicago Pneumatic Tool Co. .....Chicago.

POLISH FOR METALS.

Bertram's Oil Polish Co.....Boston.

POWER DOORS AND HATCHES.

"Long-Arm" System Co. .....Cleveland.

PRESSURE REGULATORS.

Kieley & Mueller .....New York
Ross Valve Co. .....Troy, N. Y.

BUYERS' DIRECTORY OF THE MARINE TRADE.—Continued.

PROPELLER WHEELS.

American Ship Building Co. .....Cleveland
Atlantic Works .....East Boston, Mass.
Bath Iron Works, Ltd. .....Bath, Me.
Cramp, Wm. & Sons.....Philadelphia.
Crescent Ship Yard Co .....Elizabethport, N. J.
Detroit Ship Building Co. .....Detroit.
Fore River Ship & Engine Co. .....Quincy, Mass.
Great Lakes Engineering Works.....Detroit.
Hyde Windlass Co. .....Bath, Me.
Jenks Ship Building Co. .....Port Huron, Mich.
Lockwood Mfg. Co. .....East Boston, Mass.
Macbeth Iron Co.....Cleveland.
MacKinnon Mfg. Co. .....Bay City, Mich.
Maryland Steel Co. .....Sparrow's Point, Md.
Milwaukee Dry Dock Co. .....Milwaukee.
Moran Bros. Co. .....Seattle, Wash.
Neafie & Levy Ship & Engine Bldg. Co.....Phila.
Newport News Ship Bldg. Co...Newport News, Va.
Phosphor Bronze Smelting Co., Ltd...Philadelphia.
Pusey & Jones Co. .....Wilmington, Del.
Risdon Iron Works .....San Francisco.
Roelker, H. B. .....New York.
Sheriffs Mfg. Co. .....Milwaukee.
Superior Ship Building Co.....Superior, Wis.
Thropp & Sons Co., J. E. .....Trenton, N. J.
Trigg, Wm. R. Co. .....Richmond, Va.
Trout, H. G. .....Buffalo.
United States Shipbuilding Co.....New York.

PROJECTORS, ELECTRIC.

Elwell-Parker Electric Co. .....Cleveland.
General Electric Co. .....Schenectady, N. Y.
Westinghouse Electric & Mfg. Co....Pittsburg, Pa

PUMPS FOR VARIOUS PURPOSES.

Blake, Geo. F. Mfg. Co. .....New York.
Clyde Machine Works .....Chicago.
Great Lakes Engineering Works.....Detroit.
Kingsford Foundry & Machine Wks. Oswego, N. Y.
Long Arm System Co. .....Cleveland.

PUNCHES, RIVETERS, SHEARS.

Chicago Pneumatic Tool Co. .....Chicago.

REFRIGERATING APPARATUS.

Roelker, H. B. .....New York.

REGISTER FOR CLASSIFICATION OF VESSELS.

Great Lakes Register .....Cleveland.
Record of American & Foreign Shipping.New York.

RELEASING HOOKS FOR DETACHING BOATS.

Standard Automatic Releasing Hook Co. New York.

RIVETS, STEEL, FOR SHIPS AND BOILERS.

Bourne-Fuller Co. .....Cleveland.

RANGES.

Russell & Watson .....Buffalo.

RIVETS—BRASS AND COPPER.

Waterbury Brass Co.....New York.

RUBBER INSULATED WIRES.

Roebling's Sons, Jno. A...New York and Cleveland.

SAFETY VALVES.

American Steam Gauge Co. .....Boston.
Ashton Valve Co.....Boston.
Hayden Mfg. Co., N. L.....Columbus, O.
Lunkenheimer Co. .....Cincinnati.

SAIL MAKERS.

Baker, Howard H. & Co. .....Buffalo.
Upson-Walton Co. .....Cleveland.
Wilson & Silsby .....Boston.

SALVAGE COMPANIES.

See Wrecking Companies.

SCHOOLS—NAUTICAL, ENGINEERING.

Chicago Nautical School .....Chicago.

SEARCH LIGHTS.

Elwell-Parker Electric Co. .....Cleveland.
General Electric Co. .....Schenectady, N. Y.
Westinghouse Electric & Mfg. Co....Pittsburg, Pa.

SHEARS.

See Punches, Rivets, and Shears.

SHIP AND BOILER PLATES AND SHAPES.

Bourne-Fuller Co. .....Cleveland.

SHIP BUILDERS.

American Ship Building Co. .....Cleveland.
Atlantic Works .....East Boston, Mass.
Bath Iron Works, Ltd.....Bath, Me.
Buffalo Dry Dock Co. .....Buffalo.
Columbia Iron Works .....Port Huron.
Cramp, Wm. & Sons.....Philadelphia.
Craig Ship Building Co. .....Toledo, O.
Chicago Ship Building Co.....Chicago.
Crescent Ship Yard Co .....Elizabethport, N. J.
Detroit Ship Building Co. .....Detroit.
Fore River Ship & Engine Co. .....Quincy, Mass.
Great Lakes Engineering Works.....Detroit.
Jenks Ship Building Co. .....Port Huron, Mich.
Lockwood Mfg. Co.....East Boston, Mass.
Manitowoc Dry Dock Co.....Manitowoc, Wis.
Marine Construction & Dry Dock Co.....
.....Mariner's Harbor, S. I., N. Y.
Maryland Steel Co .....Sparrow's Point, Md.
Milwaukee Dry Dock Co.....Milwaukee.
Moran Bros. Co. .....Seattle, Wash.
Neafie & Levy Ship & Engine Bldg. Co.....Phila.
Newport News Ship Bldg. Co....Newport News, Va.
Pusey & Jones Co. .....Wilmington, Del.
Risdon Iron Works .....San Francisco.
Roach's Ship Yard .....Chester, Pa.
Shipowners Dry Dock Co... .....Chicago.
Smith & Son, Abram .....Algonac, Mich.
Trigg, Wm. R. Co. .....Richmond, Va.
United States Shipbuilding Co.....New York.
Warrington Iron Works .....Chicago.
Willard, Chas. P. & Co. .....Chicago.

SHIP CHANDLERS.

Baker, Howard H. & Co. .....Buffalo.
Moran Bros. Co. .....Seattle, Wash.
Reilly Repair & Supply Co., James....New York.
Upson-Walton Co. .....Cleveland.

SHIP LANTERNS AND LAMPS.

Helvig, H. A. J.....New York.
Page Bros. & Co.....New York.
Russell & Watson.....Buffalo.

SMOOTH-ON COMPOUND, FOR REPAIRS.

Smooth-On Mfg. Co. .....Jersey City, N. J.

SPARS—LARGE SIZES.

Moran Bros. Co.....Seattle, Wash.

STAYBOLTS, IRON OR STEEL, HOLLOW, OR SOLID.

Falls Hollow Staybolt Co.....Cuyahoga Falls, O.

STEAM VESSELS FOR SALE.

Elwell, Jas. W. & Co.....New York.
Holmes, Samuel.....New York.
King, Rufus S.....New York.
McCarthy, T. R.....Montreal, Can.
Newman, R. L.....New York.
Weeks, F. H.....New York.

STEAMSHIP LINES, PASS. AND FREIGHT.

American Line.....New York.
Erie & Western Trans. Co. .....Buffalo.
Goodrich Trans Co., ...Chicago.
International Nav. Co.....Philadelphia.
Pere Marquette R. R. & S. S. Line.....Milwaukee.
Red Star Line.....New York.

STEEL CASTINGS.

Seaboard Steel Casting Co.....Chester, Pa.
Macbeth Iron Co.....Cleveland.

STEERING APPARATUS.

American Ship Building Co.....Cleveland.
Chase Machine Co. .....Cleveland.
Dake Engine Co.....Grand Haven, Mich.
Detroit Shipbuilding Co.....Detroit.
Electro-Dynamic Co.....Philadelphia.
Hyde Windlass Co.....Bath, Me.
Jenks Ship Building Co.....Port Huron, Mich.
Sheriff Mnfg. Co.....Milwaukee.

STOCKS, BONDS, SECURITIES.

Brown, W. W.....Cleveland.
Fahey & Co.....Cleveland.

SUBMARINE DIVING APPARATUS

Morse & Son, A. J.....Boston.
Schrader's Son, A.....New York.

SURVEYORS, MARINE.

Gaskin, Edward.....Buffalo.
Newman, R. L.....New York.
See, Horace.....New York.
Wood, W. J.....Chicago.

TESTS OF MATERIAL.

Hunt, Robert W. & Co.....Chicago.
Pittsburg Testing Laboratory, Ltd.....Pittsburg.

TILING, INTERLOCKING RUBBER.

New York Belting & Packing Co.....New York.

TOOLS, METAL WORKING, FOR SHIP AND ENGINE WORKS.

Allen, John F.....New York.
Chicago Pneumatic Tool Co.....Chicago.
Watson-Stillman Co.....New York.

TOOLS, WOOD WORKING.

Atlantic Works, Inc.....Philadelphia.

TOWING MACHINES.

American Ship Windlass Co.....Providence, R. I.
Chase Machine Co.....Cleveland.

TOWING COMPANIES.

Donnelly Salvage & Wrecking Co....Kingston, Ont.
Midland Towing & Wrecking Co., Ltd.Midland, Ont.

TRAPS, STEAM.

Kieley & Mueller.....New York.

TRUCKS.

Boston & Lockport Block Co..... .....Boston.

TUBING, SEAMLESS.

National Tube Co.....Pittsburg.
Waterbury Brass Co.....New York.

VALVES, STEAM SPECIALTIES, ETC.

American Steam Gauge Co. .....Boston.
Ashton Valve Co. .....Boston.
Crane Co. .....Chicago.
Farnan Brass Works .....Cleveland.
Hayden Mfg. Co., N. L.....Columbus, O.
Jenkins Bros.....New York.
Kieley & Mueller.....New York.
Lunkenheimer Co.....Cincinnati.
Ross Valve Co. .....Troy, N. Y.

VALVES FOR WATER AND GAS.

Wood & Co., R. D.....Philadelphia.
Ross Valve Co. .....Troy, N. Y.

VARNISHES.

Berry Brothers, Ltd.....Detroit.
New Jersey Zinc Co.....New York.
Also Ship Chandlers.

VESSEL CASTINGS.

American Ship Building Co.....Cleveland.
Macbeth Iron Co.....Cleveland.

VESSEL FURNISHINGS.

Sterling & Welch Co. .....Cleveland.
Williams & Rodgers Co., The.....Cleveland.

VESSEL AND FREIGHT AGENTS.

Boland, John J.....Buffalo.
Brown & Co.....Buffalo.
Brown, W. W.....Cleveland.
Dunham, R J..... .....Chicago.
Elwell, Jas. W. & Co.....New York.
Elphicke, C. W & Co.....Chicago.
Fleming & Co., P. H. .....Chicago.
Hall & Root.....Buffalo.
Helm & Co., D. T. .....Duluth.
Hawgood & Co., W. A.....Cleveland.
Holmes, Samuel.....New York.
Hutchinson & Co.....Cleveland.
King, Rufus S.....New York.
McCarthy, T. R.....Montreal.
Newman, R. L.....New York.
Mitchell & Co.....Cleveland.
Richardson, W. C.....Cleveland.
Sullivan, D. & Co.....Chicago.
Weeks, F. H.....New York.

VENTILATING APPARATUS FOR SHIPS.

Buffalo Forge Co. .....Buffalo.
Sturtevant, B. F. Co.....Boston.

WIRE—BRASS AND COPPER.

Waterbury Brass Co.....New York.

WIRE ROPE AND WIRE ROPE FITTINGS.

Baker, H. H. & Co.....Buffalo.
DeGrauw, Aymar & Co. .....New York
Upson-Walton Co.....Cleveland.

WHISTLES, STEAM.

American Steam Gauge Co. .....Boston.
Ashton Valve Co. .....Boston.
Farnan Brass Works .....Cleveland.
Lunkenheimer Co.....Cincinnati.

WHITE METAL—SHEETS, RODS AND WIRE.

Waterbury Brass Co.....New York.

WINDLASSES.

American Ship Windlass Co.....Providence, R. I.
American Ship Building Co. .....Cleveland
Hyde Windlass Co.....Bath, Me.
Jenks Ship Building Co.....Port Huron, Mich.

WINCHES.

American Ship Windlass Co.....Providence, R. I.
Hyde Windlass Co.....Bath, Me.

WOOD WORKING MACHINERY.

Atlantic Works, Inc.....Philadelphia.

WRECKING AND SALVAGE COMPANIES.

Donnelly Salvage & Wrecking Co....Kingston, Ont.
Midland Towing & Wrecking Co., Ltd.Midland, Ont.

YACHT AND BOAT BUILDERS.

Drein, Thos. & Son.....Wilmington, Del.
Lane & DeGroot.....Long Island City, N. Y.
Marine Construction & Dry Dock Co. ...New York.
Truscott Boat Mfg. Co. .....St. Joseph, Mich.
Warrington Iron Works.....Chicago.
Willard, Chas. P. & Co.....Chicago.

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Drein, Thos. & Son.....Wilmington, Del.
Lane & DeGroot.....Long Island City, N. Y.

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No. 28, N Y & Bost Ex ...	*7:40am	*8:00am
No. 40, Toledo & Buff Ac.	†10:00am	†10:40am
No. 32, Fast Mail	*11:25am	*11:30am
No. 44, Ac via Sandusky..	†1:40pm	..
No. 46, Southwestern Ex.	....	*3:00pm
No. 106, Conneaut Accom	.....	†4:30pm
No. 6, Lim Fast Mail....	*5:40pm	*5:45pm
No. 26, 20th Cent L.m. ...	*7:40pm	*7:43pm
No. 10, C., N Y & B Sp....	*7:30pm	*7:50pm
No. 16, New Eng Ex.....	*10:30pm	*10:35pm
No. 2, Day Express.	†9:10pm	†9 25pm
No. 126, Norwalk Accom.	†7:50am	.....

Westward.	Arrive from East.	Depart West.
No. 11, Southwestern Lim	*3:25am	.....
No. 7, Day Express.	.....	†6:10am
No. 15, Bost & Chi Sp.....	*3:10am	*3:15am
No. 19, Lake Shore Lim..	*7:15am	*7:20am
No. 23, Western Express.	*10:30am	*10:35am
No. 33, Southern Express	*12:25pm	....
No. 133, Cleve & Det Ex..	.....	*12:45pm
No. 47, Accomodation.....	†11.20am	†3:00pm
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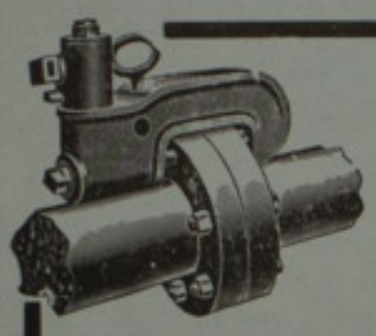

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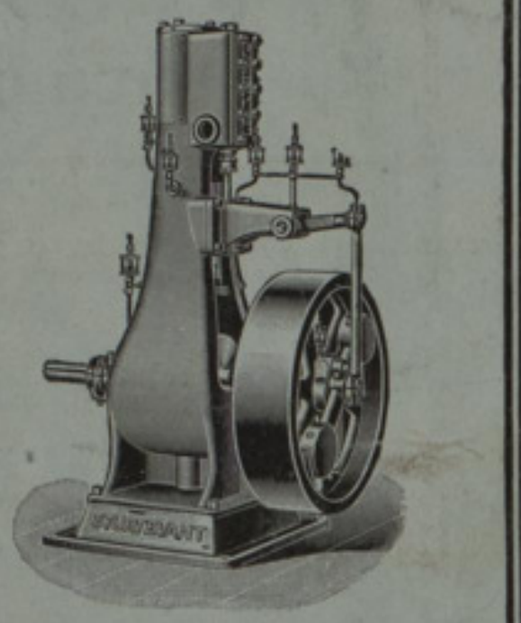

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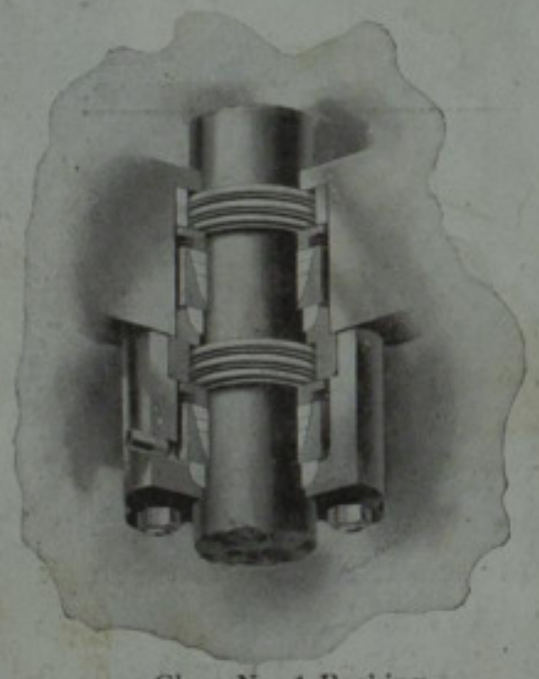

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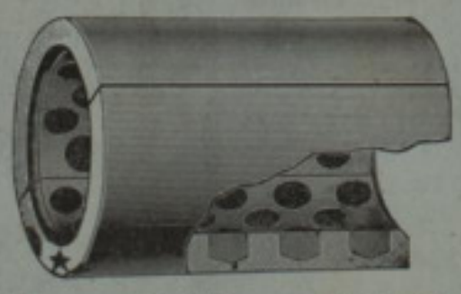

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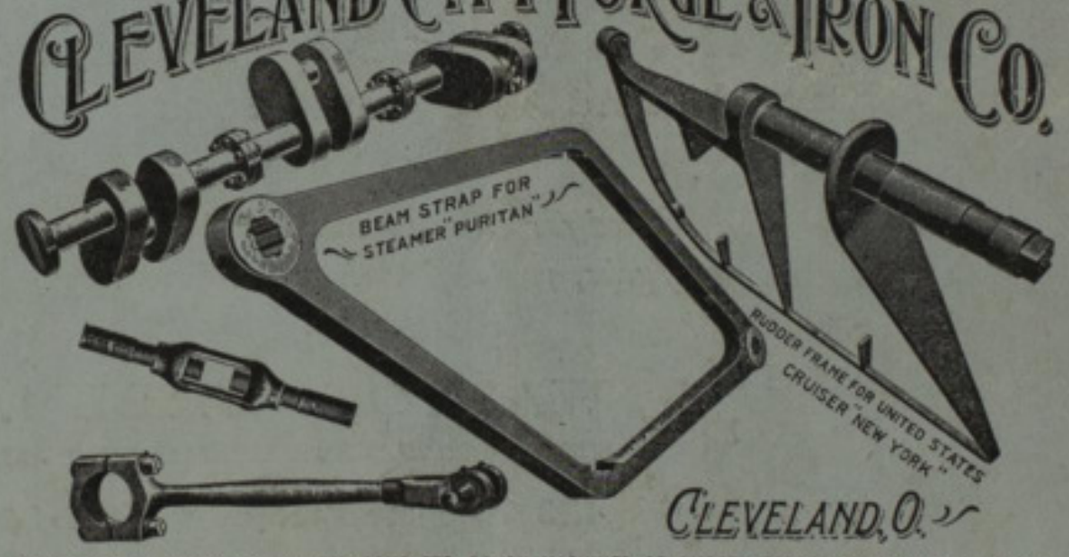

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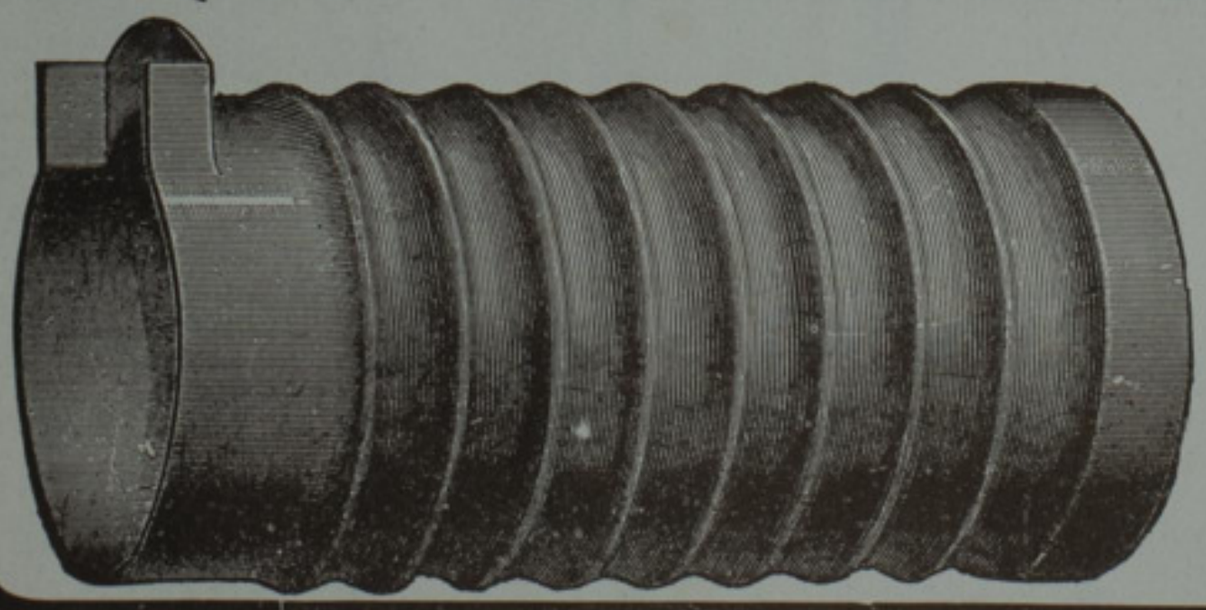

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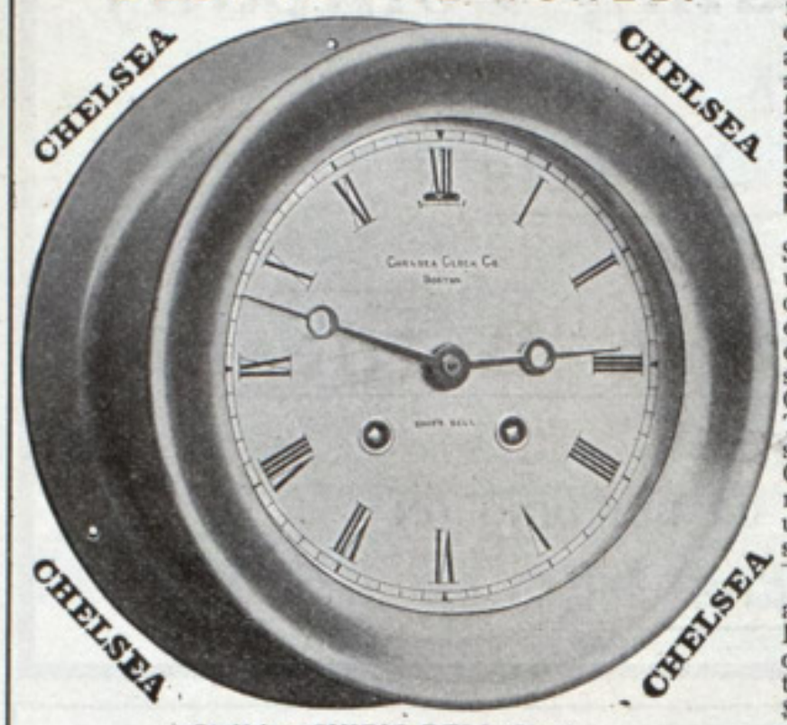

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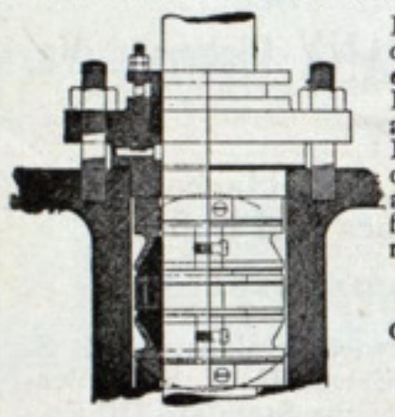

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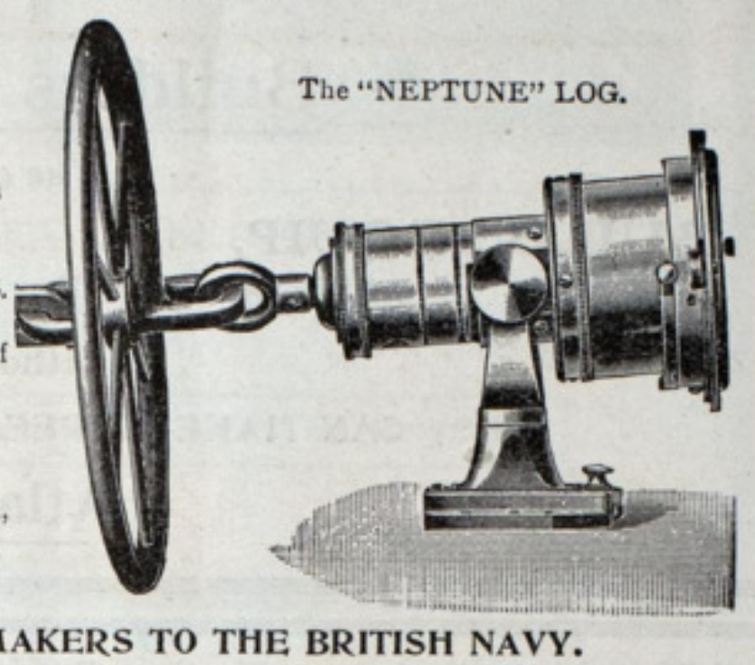

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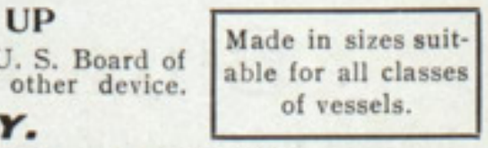

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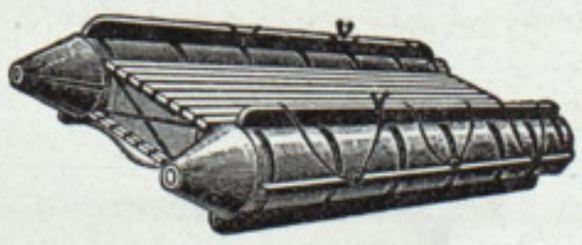

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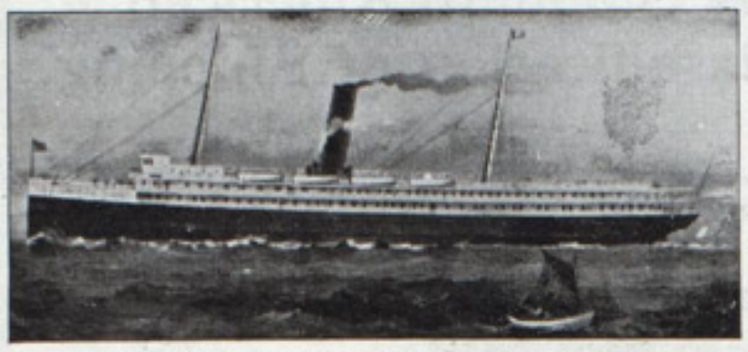

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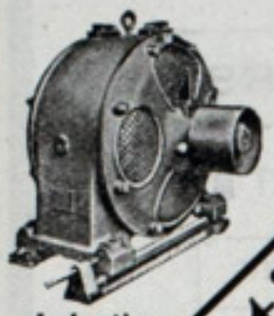

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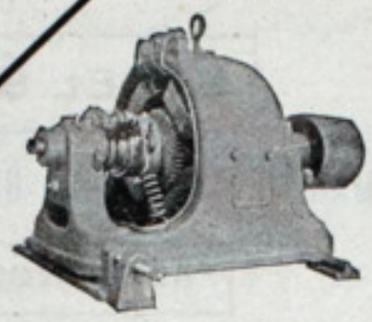

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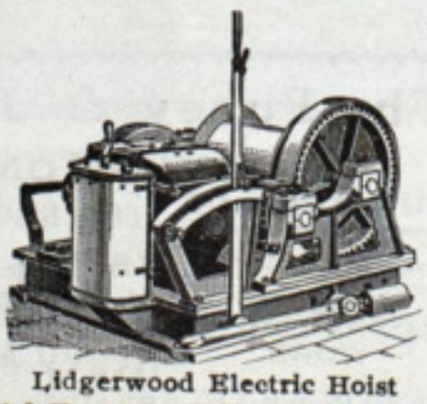

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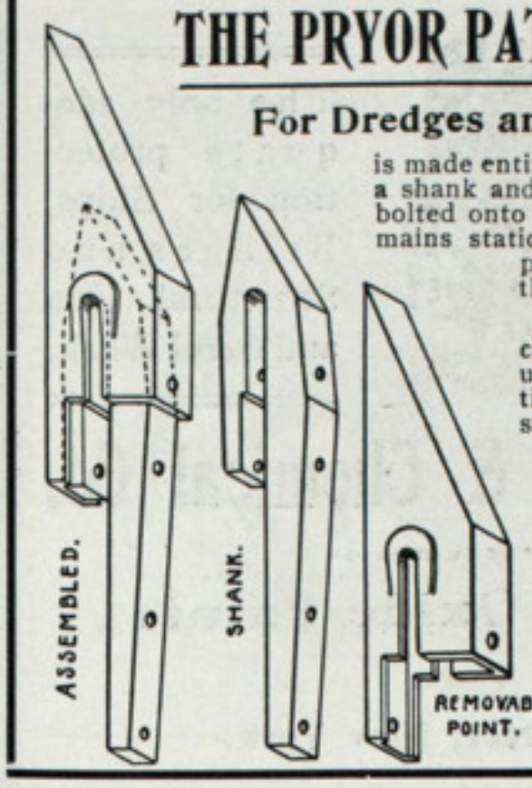

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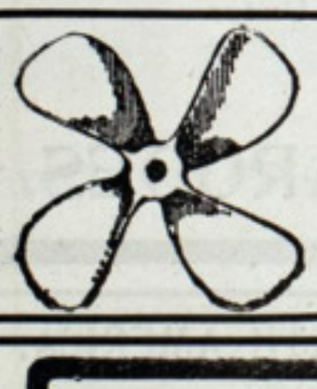

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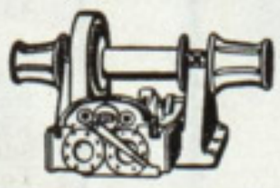

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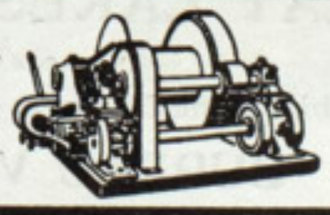

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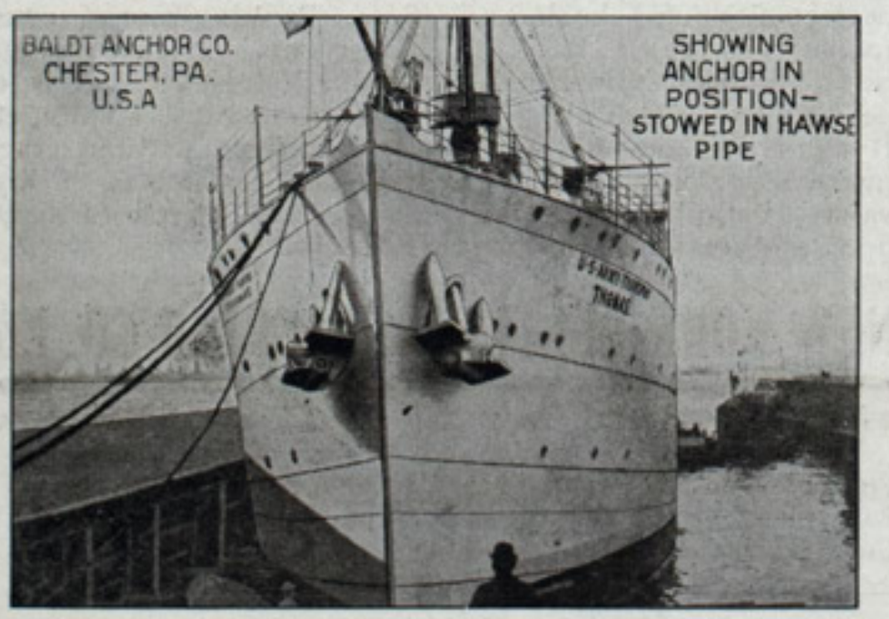

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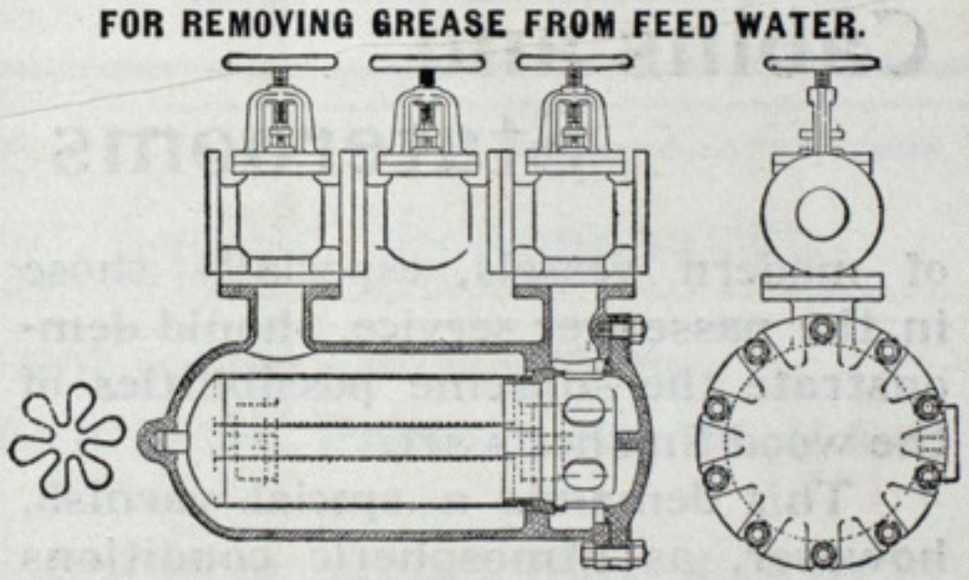

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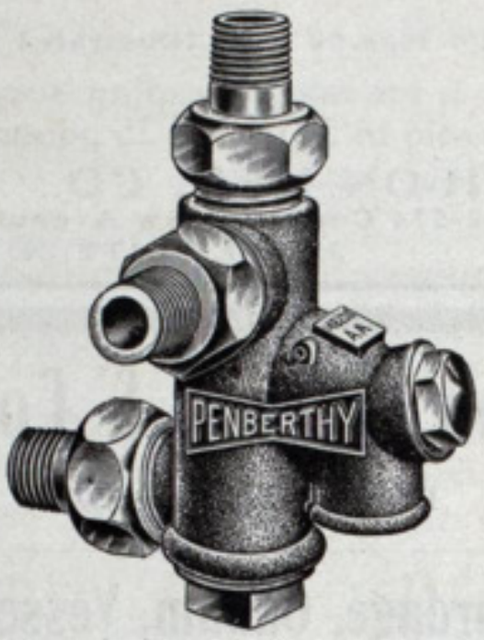

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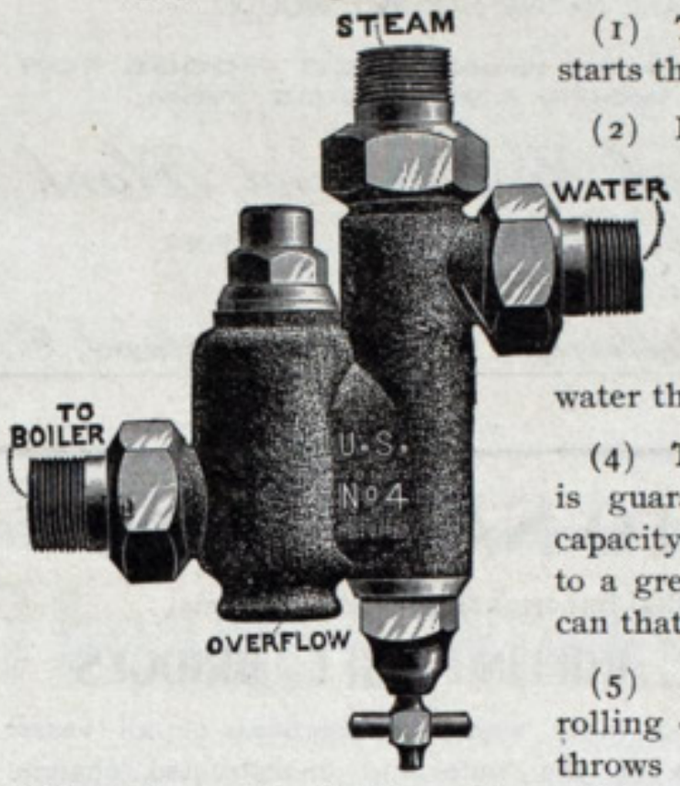

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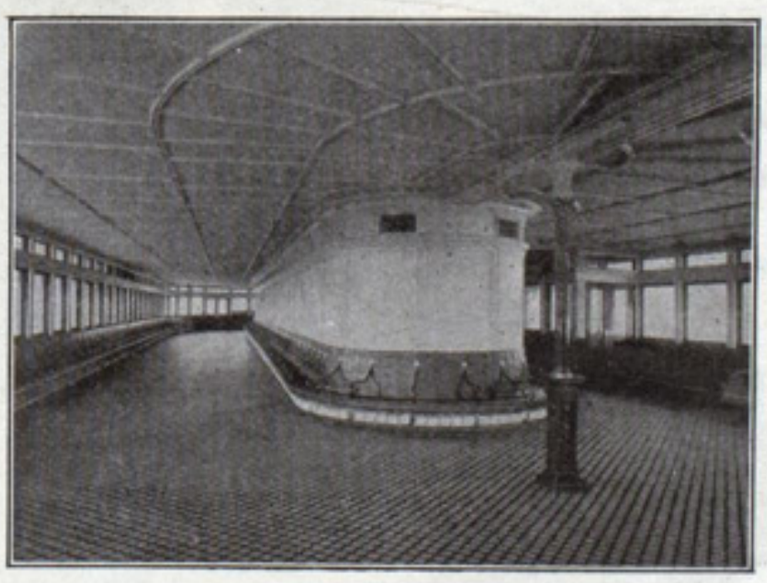

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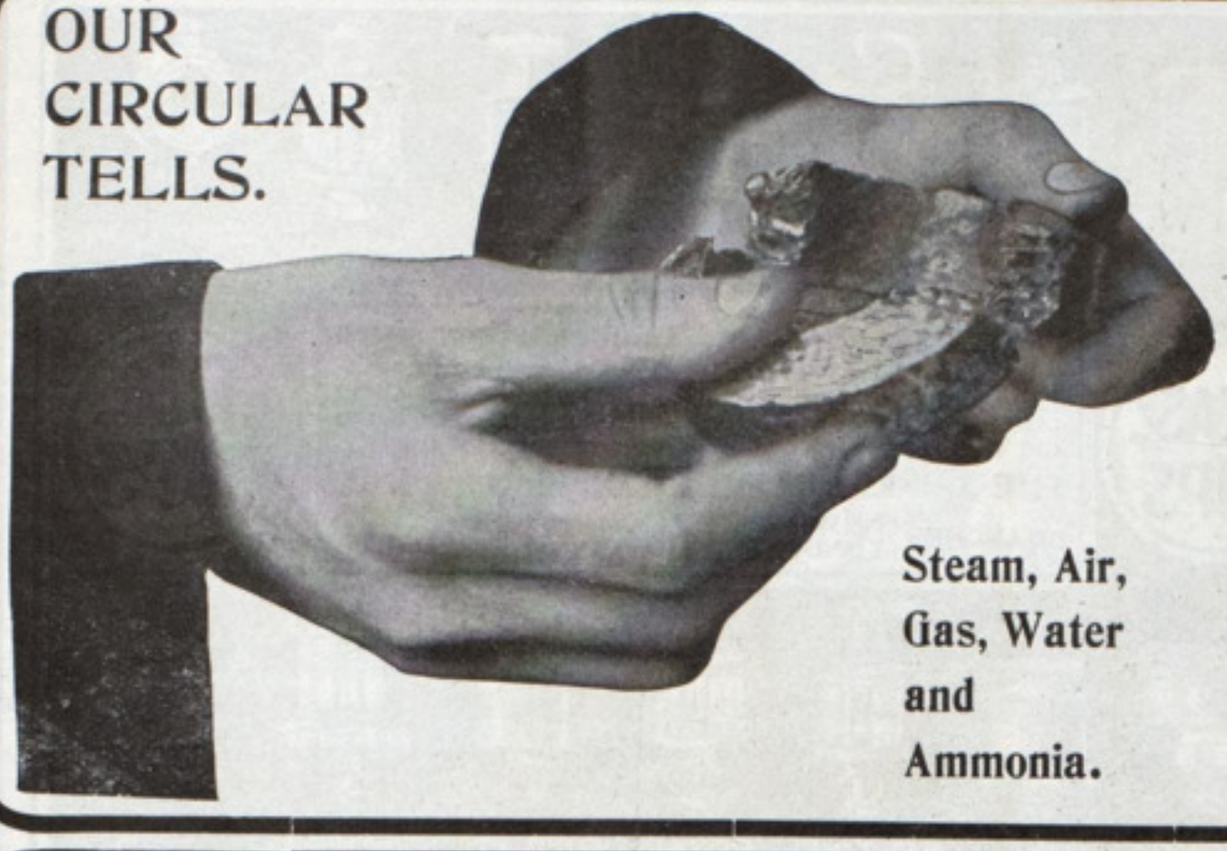

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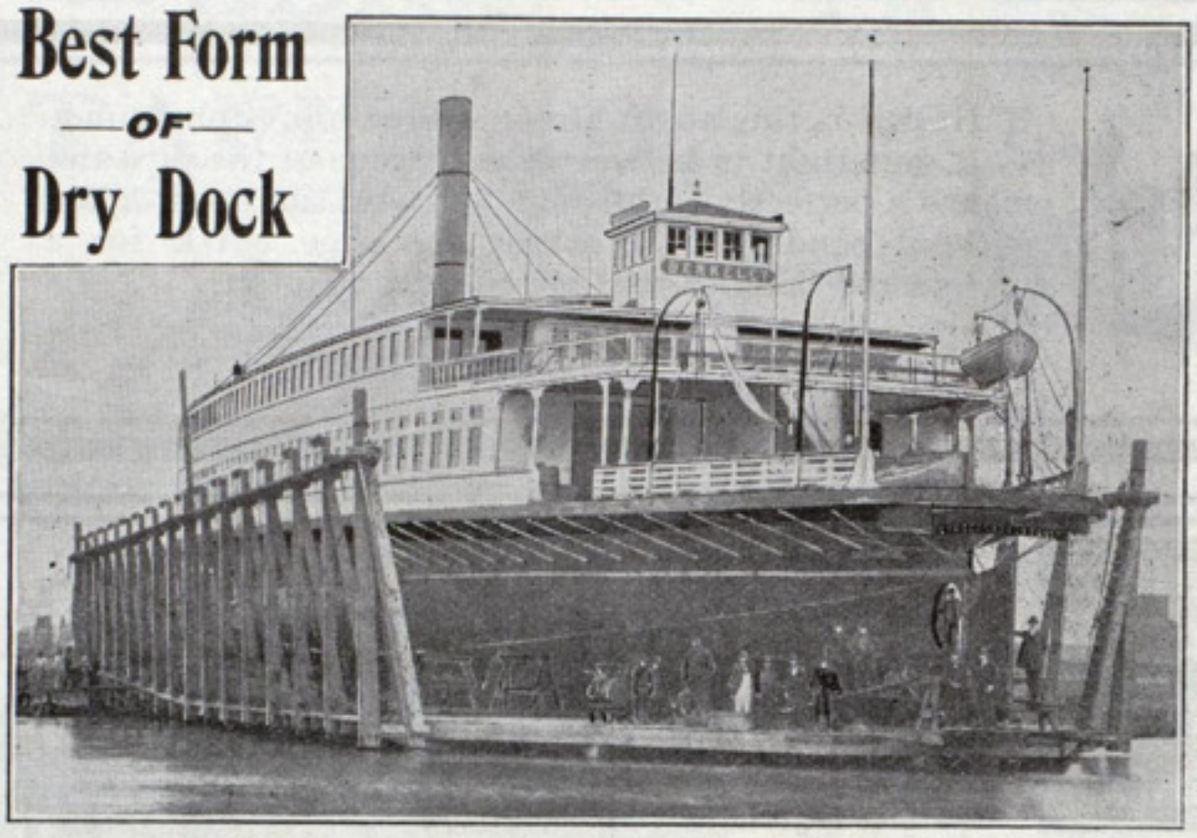

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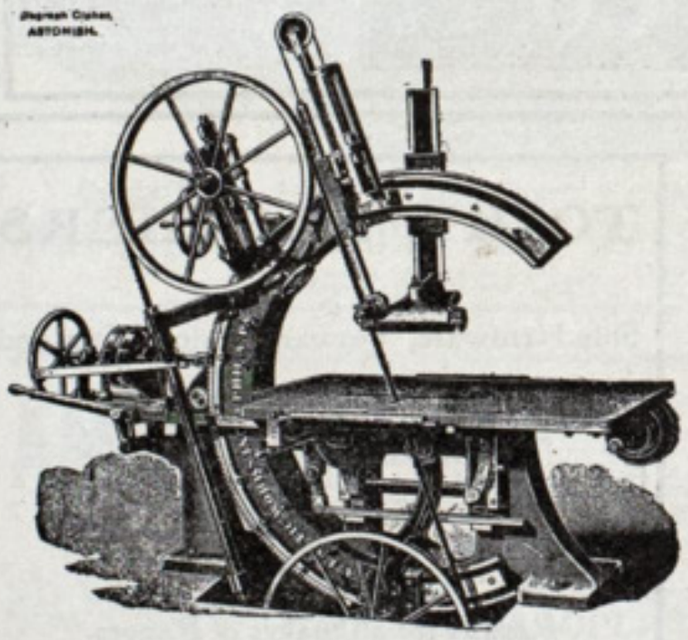

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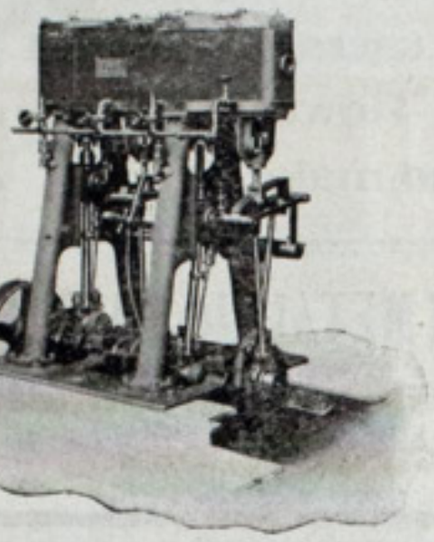

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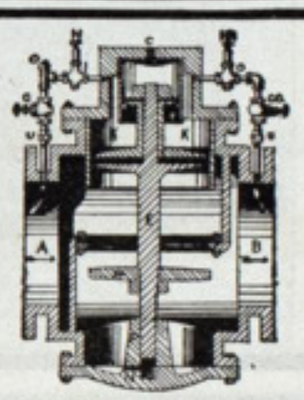

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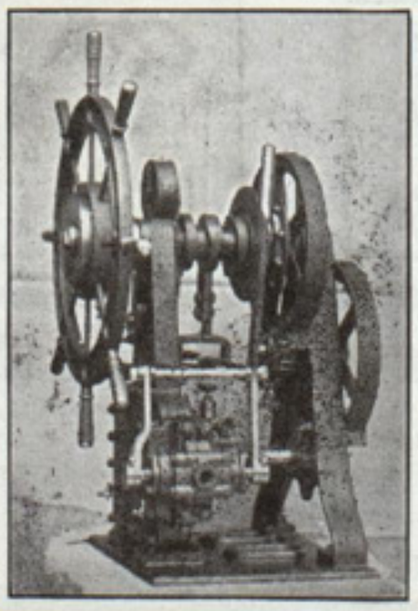

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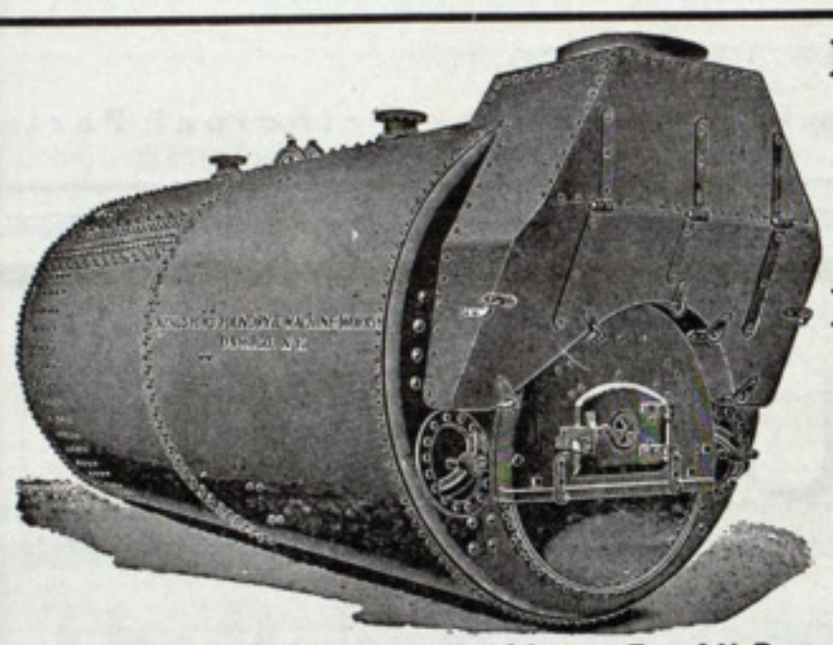

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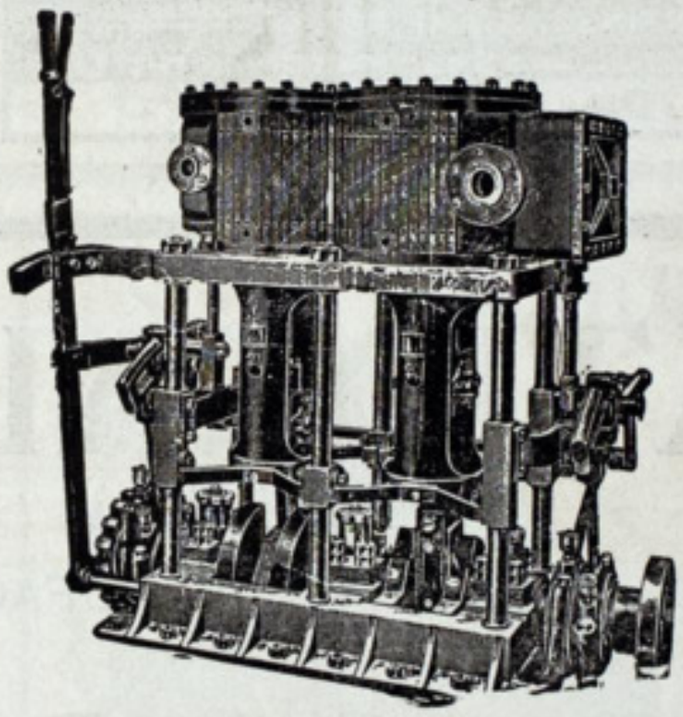

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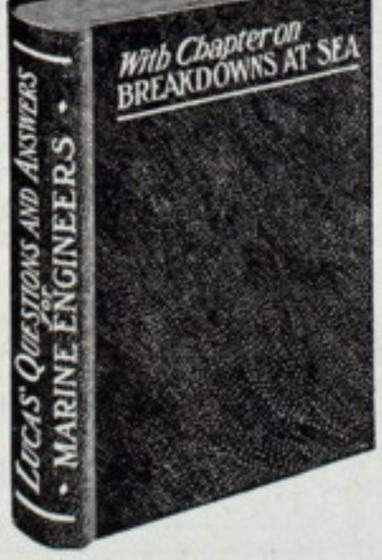

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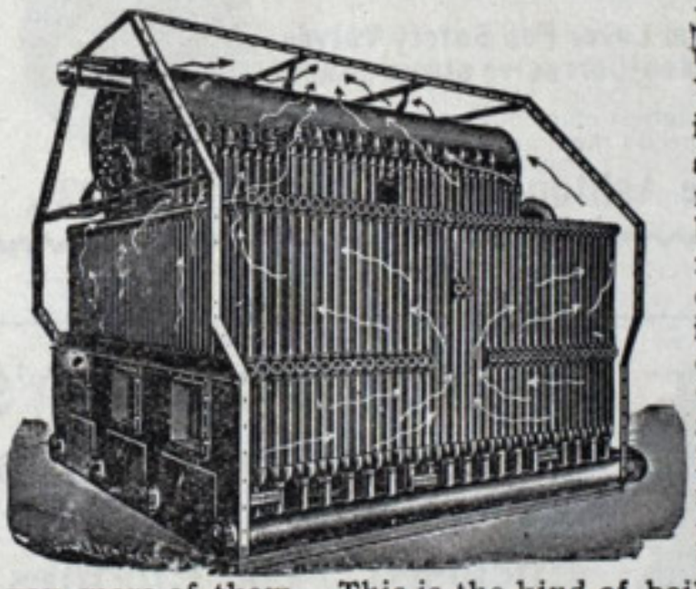

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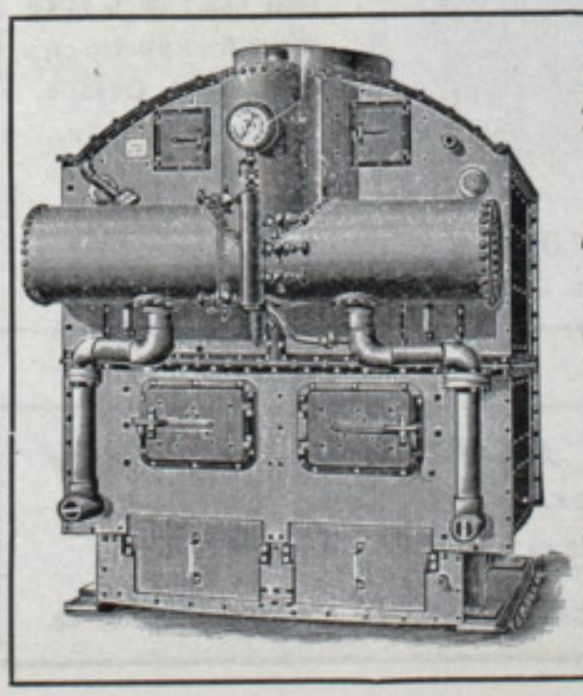

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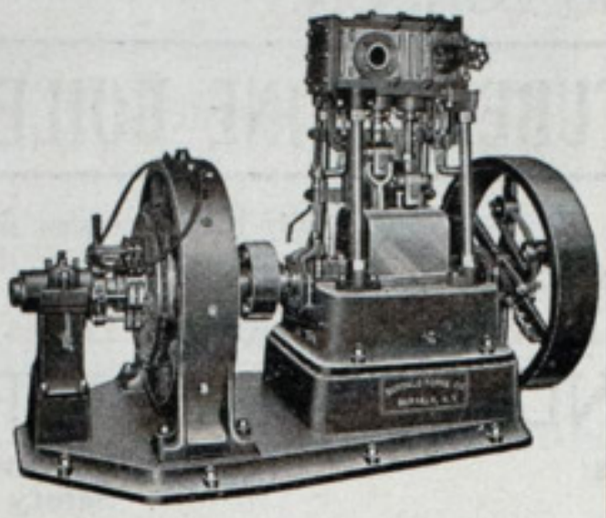

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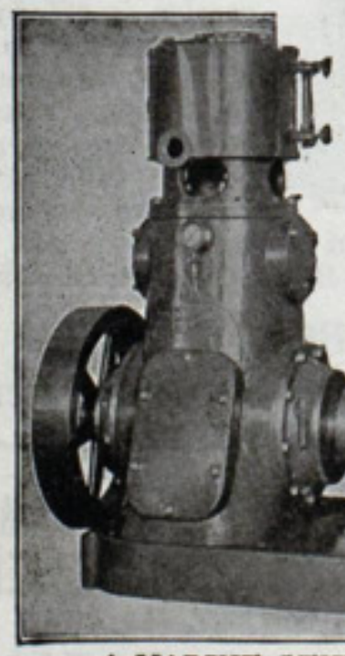

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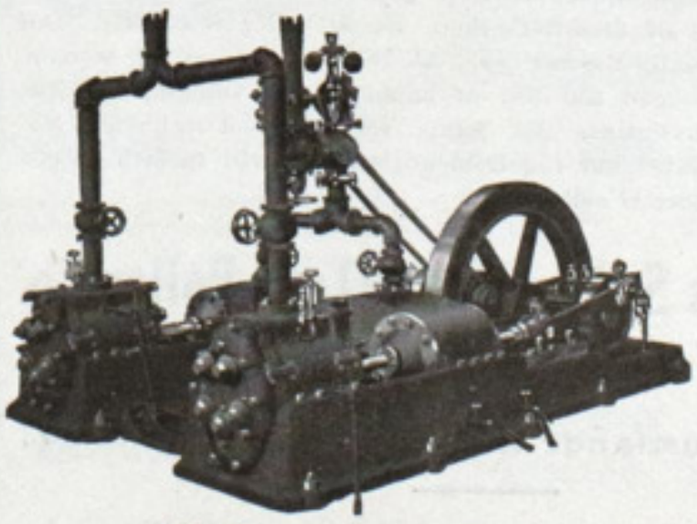

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